

Joint Pub 3-04.1



Joint Tactics, Techniques, and Procedures for Shipboard Helicopter Operations

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PREFACE

1. Scope

This publication incorporates joint and Service tactics, techniques, and procedures into a single-source publication and provides the guidance and procedures necessary to plan, coordinate, and conduct joint shipboard helicopter operations from US Navy and US Coast Guard ships.

2. Purpose

This publication has been prepared under the direction of the Chairman of the Joint Chiefs of Staff. It sets forth doctrine and selected joint tactics, techniques, and procedures (JTTP) to govern the joint activities and performance of the Armed Forces of the United States in joint operations and provides the doctrinal basis for US military involvement in multinational and interagency operations. It provides military guidance for the exercise of authority by combatant commanders and other joint force commanders and prescribes doctrine and selected tactics, techniques, and procedures for joint operations and training. It provides military guidance for use by the Armed Forces in preparing their appropriate plans. It is not the intent of this publication to restrict the authority of the joint force commander (JFC) from organizing the force and executing the mission in a manner the JFC deems most appropriate to ensure unity of effort in the accomplishment of the overall mission.

3. Application

a. Doctrine and selected tactics, techniques, and procedures and guidance established in this publication apply to the commanders of combatant commands, subunified commands, joint task forces, and subordinate components of these commands. These principles and guidance also may apply when significant forces of one Service are attached to forces of another Service or when significant forces of one Service support forces of another Service.

b. The guidance in this publication is authoritative; as such, this doctrine (or JTTP) will be followed except when, in the judgment of the commander, exceptional circumstances dictate otherwise. If conflicts arise between the contents of this publication and the contents of Service publications, this publication will take precedence for the activities of joint forces unless the Chairman of the Joint Chiefs of Staff, normally in coordination with the other members of the Joint Chiefs of Staff, has provided more current and specific guidance. Commanders of forces operating as part of a multinational (alliance or coalition) military command should follow multinational doctrine and procedures ratified by the United States. For doctrine and procedures not ratified by the United States, commanders should evaluate and follow the multinational command's doctrine and procedures, where applicable.

For the Chairman of the Joint Chiefs of Staff:



DENNIS C. BLAIR
Vice Admiral, US Navy
Director, Joint Staff

Preface

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EXECUTIVE SUMMARY

COMMANDER'S OVERVIEW

- **Discusses Shipboard Helicopter Operations**
 - **Covers Command Relationships**
 - **Provides Guidance on Training and Predeployment Preparation**
 - **Covers Aircraft Departure and Recovery Procedures**
 - **Discusses Aviation Ordnance and Hazards of Electromagnetic Radiation to Ordnance, Electromagnetic Compatibility, and Electromagnetic Vulnerability**
 - **Covers Safety and Logistics**
-

Shipboard Helicopter Operations Overview

A ship is designed to provide warfighting requirements to operate in the three-dimensional maritime environment.

In aviation support, the ship provides the combined benefits of a landing zone, maintenance and work areas, fuel farm, air operations planning facilities, and command and control, while also providing for sustainment, creature comforts, and daily necessities. The shipboard environment demands the ultimate in teamwork. At any time including peacetime, there can be an event, combat-related or otherwise, that may affect every member of the crew. It is incumbent on every person embarked on a ship to know their daily responsibilities. The Plan of the Day (POD) developed by the Executive Officer (XO) is the primary means of announcing each day's schedule of important events. Commanders of embarked Army or Air Force units should be included in the POD development to ensure their units fully understand shipboard responsibilities. These joint tactics, techniques, and procedures apply to individual operations, exercises, and training involving joint force helicopter operations from United States Navy and United States Coast Guard ships. There are many specific procedures for aircraft operations aboard aviation and aviation-capable ships that must be followed precisely to ensure safe operations. However, the aviation procedures (e.g., approach charts,

Executive Summary

wind envelopes, etc.) in this publication are subject to change, and if a conflict exists with more specific procedures, those specific procedures will have precedence.

Command Relationships

The joint force commander employs joint force air capabilities to achieve military objectives in the maritime environment.

Navy and Coast Guard regulations set forth the authority of the ship's Commanding Officer (CO) with respect to aircraft embarked in or operating from the ship. When operating with a joint helicopter detachment embarked, the joint force commander's operation order will define command relationships for the assigned mission. These command relationships will normally apply from initial embarkation until final debarkation. In all cases, the ship's CO retains authority over embarked units in all areas involving safety of the ship or its crew. A detachment officer in charge shall be provided for embarked joint operations.

Training

Maximum operational effectiveness and flight safety requires extensive training in the areas of command and control, aircraft coordination, and flight deck procedures.

An air officer, aviation officer, detachment officer in charge or a designated officer will brief the CO, XO, and helicopter control officer on normal operations, any waiver requirements, and the types of communication before commencing joint flight operations. Key air operations personnel will be briefed on planned operations by the ship's operations officer. Maintenance personnel and aircrew assigned to helicopter detachments that maintain a capability to operate from ships will receive joint helicopter operations orientation training in order to ensure their safety and effectiveness at sea.

Deployment

Success of joint helicopter detachments on ships is directly dependent on proper planning.

Operators and planners must understand the capabilities and limitations of ship and helicopter interoperability if the maximum degree of safety, flexibility, and effectiveness is to be realized. Presail planning must include sufficient leadtime to accommodate training and qualification and must be completed prior to conducting shipboard operations. The shipboard environment is inherently corrosive, and embarked aircraft will require cleaning and treatment for corrosion more frequently than shore-based aircraft.

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Aircraft Departure and Recovery Procedures

There are many procedures that must be followed for safe, organized aircraft departure and recovery.

Deck operations include proper movement, lighting, and command and display signals during all operations, including night launches and recoveries. **Flight operations include helicopter readiness conditions, air traffic control procedures, departure conditions including weather, visibility and instrument meteorological conditions, landing patterns, and visual landing aids.** Specific mission area operations and emission control procedures must also be used when appropriate.

Aviation Ordnance

The movement, handling, and stowage of explosive ordnance carried aboard ships and aircraft is inherently dangerous.

Shipboard handling and stowage of explosives and ammunition are governed by the most definitive and restrictive Department of Defense regulations and precautions. **Safety must not be jeopardized by the introduction of weapons not designed for shipboard environment nor the reliance on personnel unfamiliar with the shipboard environment.** Ships designated to support helicopter detachments involving aviation ordnance will provide approved stowage areas, security, and appropriate armament weapons support equipment. Ordnance personnel handling aviation ordnance will be limited to the minimum necessary to perform the job safely and will be qualified and certified in the applicable families of explosives. The aviation ordnance safety supervisor is the direct representative of the ship's CO. There are two conventional weapons safety assistance teams that are available to make visits to commands during aviation ordnance evolutions and predeployment training involving ordnance.

Hazards of Electromagnetic Radiation to Ordnance, Electromagnetic Compatibility, and Electromagnetic Vulnerability

The trend in radar and communications equipment toward greater radiated power has resulted in growing concern with electromagnetic radiation hazards to ordnance and the potential upset, degradation, or damage to avionics and armament systems.

These hazards are created when electro-explosive devices installed in modern ordnance are initiated by spurious electromagnetic energy emitted by microelectronic circuits and components installed in modern aircraft and weapon systems. **When joint operations are contemplated, unit commanders will consult the appropriate tables to determine which hazards of electromagnetic radiation to ordnance (HERO) or electromagnetic vulnerabilities exist and set HERO and electromagnetic compatibility conditions accordingly.**

Executive Summary

Safety

Shipboard personnel will be trained in safe operating procedures before commencement of helicopter operations.

The CO of the ship has supervisory responsibility for the safety of embarked helicopters at all times and will evaluate the hazards involved in all phases of shipboard helicopter operations and develop appropriate safety measures. Each emergency situation is unique and requires advance formulations of procedures in order to react quickly and precisely. The first consideration is for the ship to close the distance to the helicopter and prepare for immediate recovery while protecting as many personnel as possible. Back-up signals must be intact if there is a loss of communication, a need for emergency landings, or a need for emergency signals.

Logistics

There are many general procedures for providing material support for helicopter units assigned to joint operations.

The parent organization of a helicopter detachment is responsible for funding the expenses associated with aircraft maintenance and operation. Meals, supplies, cargo routing, aviation fuel, ammunition, and mail will be provided to the attached unit by the ship as a reimbursable expense. Available aviation maintenance facilities vary widely with ship class and joint force commanders are responsible for coordinating required maintenance infrastructure.

CONCLUSION

This publication incorporates joint and Service tactics, techniques, and procedures into a single-source publication and provides the guidance and procedures necessary to plan, coordinate, and conduct joint shipboard helicopter operations from US Navy and US Coast Guard ships.

CHAPTER I

SHIPBOARD HELICOPTER OPERATIONS OVERVIEW

"One of the outstanding characteristics of air power proved to be its flexibility."

**Chief Air Marshal Lord Tedder
With Prejudice, 1948**

1. General

- a. This publication provides operating and aviation ordnance procedures required to plan and conduct shipboard helicopter operations and places emphasis on single-ship, single-helicopter independent operations.

WARNING

The appendices of this publication contain approach charts, wind envelopes, and other related guidance for shipboard operations. These procedures may change without notice through the joint publication system. If a conflict exists with more specific procedures, those specific procedures will have precedence.

aviation support, the ship provides the combined benefits of a landing zone, maintenance and work areas, fuel farm, air operations planning facilities, and command and control. The ship also provides for sustainment, living, dining, and recreation provisions, as well as other daily necessities such as the ship's laundry, store, and barber shop.

d. Above all else, the shipboard environment demands the ultimate in teamwork. At any time there can be an event, combat-related or otherwise (e.g., heavy weather), that may affect every member of the crew. Even during peacetime the ever-present dangers of flooding or fire can require sounding "General Quarters," which stations the crew (including helicopter detachments) to an assigned battle station. It is important to understand the potential lethality of the flight deck environment during flight operations. If an aircraft mishap occurs, there is the real possibility of a major conflagration because of the explosive characteristics of fuel and ordnance that, if not properly responded to, may cause the loss of ship and lives. It is incumbent on every person embarked on a ship to know their responsibilities during the many evolutions that transpire during normal ship's routine. The ship's company (crew) has the responsibility to impart that knowledge to personnel not familiar with ship surroundings.

b. The publication is written to reflect routine operations for the deployment of joint force helicopters on board US Navy (USN) and US Coast Guard (USCG) ships. This is generally the result of careful presail planning, but does not preclude crisis response, surge requirements, or warfighting execution. This publication describes shipboard helicopter operational procedures for both embarked and transient aircraft and aviation detachments. Some of the terminology, regulations, and routine encountered aboard ship reflect naval traditions and contribute to efficient and safe operations.

c. As shown in Figure I-1, a ship is designed to provide the warfighting requirements to operate in the three-dimensional maritime environment. In

e. Daily shipboard routine is promulgated in the Plan Of the Day (POD). The POD is the primary means of announcing each day's schedule of important events and will normally include the daily flight schedule on

SHIPBOARD HELICOPTER OPERATING BENEFITS

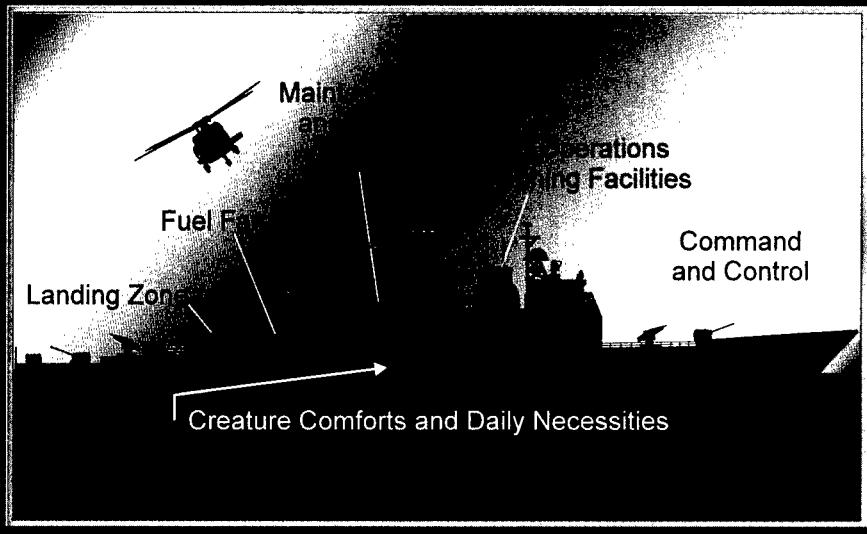


Figure I-1. Shipboard Helicopter Operating Benefits

nonaviation ships, whereas on aviation ships it will be promulgated as a daily air plan.

make the most effective use of military capabilities.

The ship's Executive Officer (XO) is responsible for the POD. Commanders of embarked Army or Air Force units should be included in the POD development to ensure their units fully understand shipboard responsibilities. For information that needs to be passed to the crew in a timely fashion, there is a general announcing system (1MC) operated from the ship's bridge.

2. Scope

a. The joint tactics, techniques, and procedures (JTTP) established by this publication apply to combatant commands, subordinate unified commands, and joint task forces. The JTTP apply to joint force helicopter operations conducted to achieve military objectives in the maritime environment. **Circumstances will demand flexible application of JTTP to**

b. These procedures apply to individual operations, exercises, and training involving joint force helicopter operations from USN and USCG ships. General procedures relating to staging and operating in the shipboard environment are addressed. However, specific mission tactics or procedures are not covered. Consult the source documents listed in Appendix H, "References," for specific procedures. Wind envelopes (the wind limits for individual helicopter and ship combinations) are contained in Naval Warfare Publication (NWP) 3-04.1M, "Helicopter Operating Procedures for Air Capable Ships" and commandant USCG instruction (COMDTINST) M3710.2, "Coast Guard Shipboard Helicopter Operational Procedures Manual." These publications can be obtained through normal Military Service publication distribution

Shipboard Helicopter Operations Overview

centers. Requests for inclusion on the NWP 3-04.1M distribution list should be forwarded to:

Chief of Naval Operations (N889F)
Pentagon, Room 4E419
Washington, D.C. 20350-2000
DSN: 224-6024
Commercial: (703) 614-6024

Requests for inclusion on the COMDTINST M3710.2 distribution list should be forwarded to:

Commandant (G-OCA)
USCG Headquarters
2100 Second St. (SW)
Washington, DC 20593-0001
Commercial: (202) 267-0952

If there is a conflict between the shipboard wind envelopes in these publications and the aircraft flight manual, the flight manual will take precedence. If no Navy-approved wind envelope exists, the general wind envelope contained in NWP3-04.1M shall be utilized.

c. This publication addresses JTTP for joint operations. Ships and aviation units contemplating such operations are required to obtain and maintain their mission- or aircraft-specific qualifications and proficiency in accordance with parent-Service regulations.

3. Objective

This publication provides guidelines for the safe and effective conduct of joint helicopter operations from USN and USCG ships. It also serves as a planning and implementation guide for joint force commanders (JFCs).

4. Ship Capabilities

USN and USCG ships capable of operating with aircraft are grouped into **three types of**

aviation-capable ships. The single point of contact for all aspects of aviation facility certification is:

Commander
Naval Air Systems Command (PMA251D)
1421 Jefferson Davis Hwy
Arlington, VA 22243-5120

a. **Air-Capable Ships (ACS).** Most USN and USCG ships are classified as ACS, which are **characterized by small flight decks on the stern, bow, or both.** Due to the size of some smaller flight decks, certain helicopters are limited to hover operations only. **Most flight decks provide one helicopter landing spot, although some provide two or four landing spots. Air-capable ships are divided into three levels** which describe the environmental conditions in which each ship is capable of operating.

- **Level I ships** are capable of operations day or night, in visual meteorological conditions (VMC) or instrument meteorological conditions (IMC), and are equipped with tactical air navigation (TACAN) and ultra high frequency (UHF) homer.
- **Level II ships** are capable of day or night, VMC operations only.
- **Level III ships** are capable of day, VMC operations only.
- **Each level is further divided into seven (7) classes** which describe specific type helicopter support capability of each ship:
 - **Class 1 ships** provide landing clearance, a hangar, fuel and electrical service, and full maintenance facilities.
 - **Class 2 ships** provide landing clearance plus fuel and electrical service.

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- Class 2A ships provide landing clearance plus fuel and direct current electrical service.
 - Class 3 ships provide landing clearance.
 - Class 4 ships provide hover clearance down to five (5) feet.
 - Class 5 ships provide hover clearance above 15 feet.
 - Class 6 ships provide helicopter in-flight refueling (HIFR).
- flight decks with multiple landing spots, a large hangar below the flight deck, and full maintenance and service capabilities. These ships are day and night all-helicopter and vertical/short takeoff and landing (V/STOL) operations capable, aided by a TACAN and full radar services from the helicopter direction center (HDC). Refer to NAVAIR 00-80T-106, "LHA/LPH/LHD NATOPS Manual," for detailed procedures when operating with AAAS. The shipboard aviation facilities' resume (NAEC-ENG-7576) provides level and class capabilities and flight deck diagrams for each AAAS.

Note: Refer to NWP 3-04.1M, "Helicopter Operating Procedures for Air Capable Ships," for detailed procedures when operating with Navy air-capable ships or to COMDTINST M3710.2 (series) when operating with Coast Guard air-capable ships.

b. **Amphibious Aviation Assault Ships (AAAS).** The Navy has three ship classes which fall into this category: **amphibious assault ship, landing platform helicopter (LPH), general purpose amphibious assault ship (LHA), and general purpose amphibious assault ship (with internal dock) (LHD).** These ships are characterized by large

c. **Aviation Ships.** Conventional aircraft carriers (CVs) and nuclear-powered aircraft carriers are the only ships in this category. Helicopters can expect full services and maintenance support when operating from aviation ships. The carrier air traffic control center (CATCC) provides complete radar service in all weather, day and night. Refer to NAVAIR 00-80T-105, "CV NATOPS Manual," for detailed procedures when operating with aviation ships.

5. Flight Operations

Specifics of shipboard helicopter operations are addressed in detail by this publication. A



Helicopters can expect full support when operating from aviation ships.

Shipboard Helicopter Operations Overview

quick overview of events will provide a general impression of what to expect in maritime helicopter operations.

a. From the aircrew perspective, there is a sequence of events that occurs when flying inbound for landing on a ship.

Simultaneously, the ship will be executing a series of evolutions to receive the inbound helicopter. Having received an overhead message from the ship in advance of scheduled operations, the aircrew will know the ship's location, assigned radio and navigation aid frequencies, and the time to arrive overhead the ship.

b. Unless constrained by outside influences (other ships, restricted or warning areas, national airspace, military operating areas), **ships have airspace control areas that need to be adhered to**. See Appendix B, "Control Areas and Approach Charts," for detailed information. Aircrews are expected to check in with the ship prior to entering the control area or, emission control conditions permitting, as soon as possible. When communicating with the ship, the international or daily changing call sign (as specified in the overhead message) should be used. The aircraft will be asked for information including:

- Position;
- Souls on board; and
- Fuel remaining.

c. The ship's secondary controlled airspace, the control zone, extends out 5 nautical miles in radius up to 2500 feet mean sea level, similar to Class C airspace as defined by the Federal Aviation Administration. At this juncture or when advised, the helicopter reinitiates radio contact with the ship and should receive pertinent landing information to include:

- Deck status information (red, not ready to conduct flight operations, or green, ready to conduct flight operations);

- Base recovery course (BRC) of ship (magnetic heading of ship during aircraft recovery);
- Wind speed and direction over the deck;
- Pitch and roll of the ship; and
- Altimeter setting.

d. From the ship's perspective, after a helicopter checks in for landing, the ship commences preparations to receive the helicopter. The helicopter will communicate with a controller. The controller notifies the combat information center (CIC) watch officer or tactical action officer, who in turn informs the officer of the deck (OOD) of the inbound helicopter. The OOD, with clearance from the ship's captain, directs that flight quarters be set. The OOD is responsible for the safety of the ship.

e. The manning of flight quarters literally impacts the entire ship, especially with smaller surface combatants. Sailors from every division participate as part of the flight quarters team. They will make up the firefighting team, high-capacity firefighting foam stations, search and rescue (SAR) boat crew, repair parties, helicopter control station, sound-powered phone talkers, signal bridge, and other teams and stations dependent on the type of operations to expect. **Flight quarters is a manpower-intensive evolution from the ship's perspective, and therefore it is imperative that it be completed as quickly and efficiently as possible.** In addition, the embarked helicopter detachment will establish an integrity watch bill to ensure that responsible personnel maintain aircraft security when not at actual flight quarters. The integrity watch provides general security for

Chapter I

embarked aircraft, to include checking chains and chocks.

f. In VMC, the aircrew will report visual acquisition of the ship and, unless otherwise directed, proceed inbound toward the ship for landing. When the helicopter control officer (HCO) in the helicopter control station (HCS) visually sights the helicopter, this information is reported to the OOD and CIC. After visual sighting, control of the helicopter is turned over from CIC to the HCO. The analogy is a handoff from approach control to the tower. The HCO passes base recovery course (BRC), wind over the deck, pitch (vertical motion of the deck), and roll of the deck and clearance to land. A typical call from the HCO would be:

"Aircraft call sign, green deck (ship is ready to conduct flight operations), BRC is 180 (magnetic heading of ship), winds are 30 degrees to port (30 degrees off centerline of ship to the left side, looking from the back of the ship toward the front of the ship) at 10 knots, pitch one, roll four (amount of ship's movement in degrees), altimeter 29.92."

g. The helicopter will then complete the landing checklist prior to final approach to landing and report "landing checklist complete, gear down and locked (if applicable), right seat (or left seat) landing." This cues the landing signal enlisted (LSE) in the Navy or landing signal officer (LSO) in the Coast Guard to properly position on the flight deck so as to provide direction and maintain eye contact with the pilot at the controls.

h. The greatest degree of difference between land and sea operations during the landing phase occurs from short final to wheels on deck. For both, the rate of closure to the intended landing spot is affected by head winds, but for the sea environment this is

complicated by relative motion due to the ship's movement through the water. As the helicopter approaches the flight deck, the uninitiated should avoid a tendency to fixate on the movement of white water from the ship's waterline to the wake. Another area of caution is accounting for burble effects of wind around the superstructure of the ship. Frequently as the flight deck is approached, there is a tendency to get hung up by the invisible "wall" on smaller ships, an area of pressure or wind that requires a correction of additional power and nose attitude to transition. As soon as the "wall" is overcome, the correction is immediately canceled, and the helicopter air taxies to a hover over the spot and lands.

i. In hovering over the deck, it is extremely important to guard against drift and a tendency to overcorrect. The pilot's scan should not be limited to the immediate flight deck vicinity but should include the horizon, ship's amidships, and the flight deck area. The amidships (middle of the ship) is the area of least movement as seas increase in intensity. This will reduce the propensity to "chase the deck," which makes the shipboard landing more difficult. When stabilized over the deck and ready to set down, the pilot needs to time the deck so the helicopter touches down at that moment the ship moves the least, the bottom or top of the swell, the top being preferred. It is important not to land as the deck is coming up. Under the right conditions a hard landing can result, which could damage the aircraft.

j. Once the helicopter is safe on deck, it will normally be chocked and chained (if applicable) to the deck to prevent movement. The HCO then reports to the OOD that the helicopter is secured, which allows the OOD to maneuver the ship with due caution to any helicopters with engaged rotors on the flight deck. If the helicopter disengages the rotor system and shuts down, the OOD will maintain winds over the deck

Shipboard Helicopter Operations Overview

within the engagement and disengagement envelope per NWP 3-04.1M, "Helicopter Operating Procedures for Air Capable Ships," COMDTINST M3710.2, "USCG Shipboard Helicopter Operational Procedures Manual," or aircraft flight manuals. If no engagement and/or disengagement wind envelope exists the OOD will maintain the same course as during landing. An amber deck status light (yellow signal light) will be provided to signal disengagement. Rotor engagement or disengagement is a hazardous evolution, particularly when winds are strong or gusty, the deck is moving, or the helicopter does not have droop stops and/or rotor brake.

k. After the shutdown of the helicopter is complete, the pilot(s) report to CIC for mission debriefing.

l. The launch sequence is basically the reverse of the recovery sequence. Approximately 90 minutes before the scheduled launch time, the pilot(s) reports to CIC for a mission brief. Embarked Army aviation units will include the CIC in their preparation and briefings for large heliborne operations. For single-helicopter missions, the embarked unit operations personnel will coordinate mission details with the CIC and be included in the air mission brief. The responsibility for coordination with CIC rests with the embarked Army aviation unit commander. Approximately 30 minutes before launch time, the ship sets flight quarters. If the helicopter is not spotted on the deck already, preparations are made to do so. The aircrew accomplishes the preflight checklist and boards the aircraft, completing the checklists up to engine start.

m. At this point, permission is requested from the HCO to start engine(s). A red deck

status light will be provided in coordination with the LSE or LSO for clearance to start engine(s). The aircrew then requires clearance to engage the rotor system from the HCO. The HCO and OOD shall ensure the winds over the deck are within the engagement and/or disengagement envelope before clearance to engage is granted. Rotor engagement is done under a yellow deck status light. For those helicopters with simultaneous engine start and rotor engagement, the evolution will be accomplished using the yellow deck status light. As with rotor disengagement, the rotor engagement can be hazardous until the blades achieve sufficient speed.

n. **Takeoff clearance will be provided by the ship's Commanding Officer (CO) via the OOD and HCO in conjunction with the green deck status light and signal from the LSE or LSO.** The HCO will relay ship's BRC, wind, pitch and roll, altimeter, and permission to launch. When ready, the aircrew (using hand signals) calls for the removal of the chocks and tie-down chains (it is the pilot's prerogative to fly out of the chocks or take off without chocks in place).

o. With chains and/or chocks removed, the helicopter lifts into a hover, checks gauges and power, then slides out over the side of the ship (usually parallel to the line-up line) and executes a normal takeoff. **Again, it is important to properly time the deck. Takeoff is best accomplished as a swell lifts the deck.**

p. When safely airborne, the helicopter reports "operations normal" to the HCO, who in turn passes the helicopter to the controller in CIC. Mission dependent, the ship may or may not stand down from flight quarters or go to a 15 minute standby to resume flight quarters.

Chapter I

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CHAPTER II

COMMAND RELATIONSHIPS

"The art of command is not that of thinking and deciding for one's subordinates as though one stood in their shoes."

Marshal of France Ferdinand Foch
Precepts and Judgments, 1949

1. Purpose

This publication provides guidance for command relationships when helicopter units embark on ships.

2. Joint Force Commander

Combatant commanders exercise combatant command (command authority) over assigned forces. Subordinate JFCs will exercise operational control over assigned forces in accordance with Joint Pub 0-2, "Unified Action Armed Forces (UNAAF)."

The JFC employs joint force air forces or capabilities to achieve military objectives in the maritime environment.

3. Ship's Commanding Officer

USN and USCG regulations set forth the authority of the ship's CO with respect to aircraft embarked in or operating from the ship. **When operating with a joint helicopter detachment embarked, the JFC's operation order (OPORD) will define command relationships for the assigned mission.** These command relationships will normally apply from initial embarkation until final debarkation. **In all cases, the ship's CO retains authority over embarked units in all areas involving safety of the ship or its crew.**

4. Detachment Officer In Charge

A detachment officer in charge (OIC) shall be provided for embarked joint

operations. The OIC reports directly to the ship's CO, air wing commander, or authority specified by the JFC for the mission assigned. Administratively, the OIC normally reports to the ship's XO for matters of day-to-day routine with respect to the detachment while embarked on the ship. When embarked on an aviation-capable or amphibious assault aviation ship, the OIC reports to the officer specified in the appropriate JFC tasking order regarding the assigned mission and administrative routine. Normal procedure will be for the organic helicopter squadron on the aircraft carrier to act as host for a helicopter detachment and to provide liaison between the detachment, the ship, and the embarked air wing. **The OIC has the authority and responsibility for the following:**

- a. Initiate coordination for a presail conference. (See sample checklist in Appendix A, "Sample Formats.")
- b. Coordinate detachment embarkation requirements with the XO of the ship.
- c. Provide certification documents to the ship's CO on the detachment's completion of presail requirements as set forth in paragraph 2 of Chapter IV, "Predeployment."
- d. Coordinate all requirements for communications to higher authority with the ship's CO.
- e. Apprise the ship's CO and operations officer of operational and support requirements that directly affect the ship's operations.

Chapter II

f. Apprise the ship's CO of detachment readiness when required for operational reporting requirements to higher authority.

g. Ensure detachment compliance with ship's routine operating and administrative instructions.

5. Scheduling and Funding

a. **In order to program sufficient resources over the long term, estimates for annual training requirements will be provided to combatant commanders by the parent Service.** Routine training requirements will be submitted in time for

inclusion in the quarterly employment schedule conferences. Emergent training requirements identified after the quarterly employment schedules conference will be handled case-by-case.

b. **The Navy and Coast Guard will provide ship services to support military deck landing qualification (DLQ) training requirements.** Individual Services will provide assets to conduct the training and will be responsible for helicopter operating costs. Expenses for temporary duty personnel and operating costs to provide deck qualification training for military aviators will be borne by the respective Service.



The ship's CO retains authority over helicopter units embarked where safety of the ship or its crew is involved.

CHAPTER III

TRAINING

"Individual training is the foundation on which unit effectiveness is built."

LT GEN Arthur S. Collins, Jr.
Common Sense Training, 1978

1. Training Ship's Personnel

Helicopter operations from ships place both ship and flight personnel in a unique and demanding environment. Close coordination and proper actions are required by all personnel at all times. Operational effectiveness and flight safety require extensive training in the areas of command and control, aircraft coordination, and flight deck procedures. In addition to the standard requirements beginning in paragraph 2 of Chapter IV, "Predeployment," the following additional requirements will be met in order to safely operate helicopters aboard ships.

a. In order to provide the required amount of teamwork and enhance flight safety, the air officer, aviation officer, detachment OIC, or a designated officer shall conduct the following briefings:

- **Commanding Officer and Executive Officer.** The CO and XO will receive a thorough brief from the air or aviation department head and the OIC of the Service helicopter detachment. This briefing will cover, but should not be limited to, aircraft capabilities, planned training, and operational evolutions, with impact on ship's schedule and waiver requirements emphasized. Particular emphasis will be placed on the relation of each evolution to normal operations and any waiver requirements.
- **Helicopter Control Officer.** The HCO or air officer will thoroughly brief the OIC of the Service unit before

commencing joint flight operations. This brief will cover, but is not limited to the following:

- Radio communications and terminology. (See recommended brevity codes in Appendix G, "Brevity Codes.")
- Light and hand signals.
- Aircraft configuration, including fueling, armament, tiedown, and rescue specifics.
- Night-vision device (NVD) procedures and operating techniques.
- Emergency procedures.

b. **Ship's Air or Aviation Officer, Flight Deck Officer or Director, and Flight Deck Cargo Supervisor.** Key air operations personnel will be briefed on planned operations by the ship's operations officer. Coordination of flight deck evolutions and operation-specific procedures will be covered in detail.

c. **Officer of the Deck.** All OODs will be briefed by the air or aviation department head and operations officer regarding specific limitations on deck movement, wind envelopes, and the ship's light configuration.

d. **Engineer Officer or Aviation Fuels Officer.** These officers will be briefed by the embarked detachment with regard to the type of fuel to be brought aboard by the Service units, fuel requirements, and fueling or defueling procedures once aboard. Particular

Chapter III

attention will be paid to the hazards of JP-4/8 and its effect on storage risks, volatility of mixtures, and firefighting considerations. The engineering or aviation fuels officer is responsible for routine fuel sample inspections and will provide a fuel sample for the helicopter aircraft commander during “hot refuelings” (refueling with engines, auxiliary power units, and/or rotors in operation).

e. Crash Crew or Fire Party On-Scene Leader. Firefighting and rescue personnel will be briefed by the embarked detachment regarding aircraft particulars as they pertain to rescue and salvage operations. Once embarked for operations, the helicopter detachments will provide crash crew personnel with orientation lectures on rescue access, armament safing, ordnance, firefighting hazards, and aircraft emergency shutdown procedures.

f. Landing Signal Officer or Landing Signalman Enlisted. The LSO or LSE will be briefed by the embarked detachment on special requirements with regard to lighting, signals, NVDs, aircraft securing, and fueling operations.

g. Air Controllers and Combat Information Center Personnel. Air control personnel will be briefed by the operations officer with regard to communications and identification equipment, SAR capabilities, weather criteria, and instrument approach procedures.

h. Flight Deck Personnel. Flight deck personnel will be briefed by the embarked detachment on platform-specific procedures for fueling and deck handling evolutions, including procedures for the use of NVDs if their use is planned.

i. Ship’s Company Briefs. When applicable, the ship’s company will be briefed by the executive department regarding

operations security aspects and restrictive lighting measures, including the lighting hazards during NVD operations.

2. Training of Embarked Personnel

Maintenance personnel and aircrew assigned to helicopter detachments that maintain a capability to operate from ships will receive joint helicopter operations orientation training in order to ensure their safety and effectiveness at sea. These requirements apply to embarked operations and are not intended to restrict personnel whose exposure to the shipboard environment is limited to DLQ training periods. The following requirements will be met for all situations except for immediate operational requirements where the success of the mission would be clearly jeopardized by delaying operations until required training can be obtained.

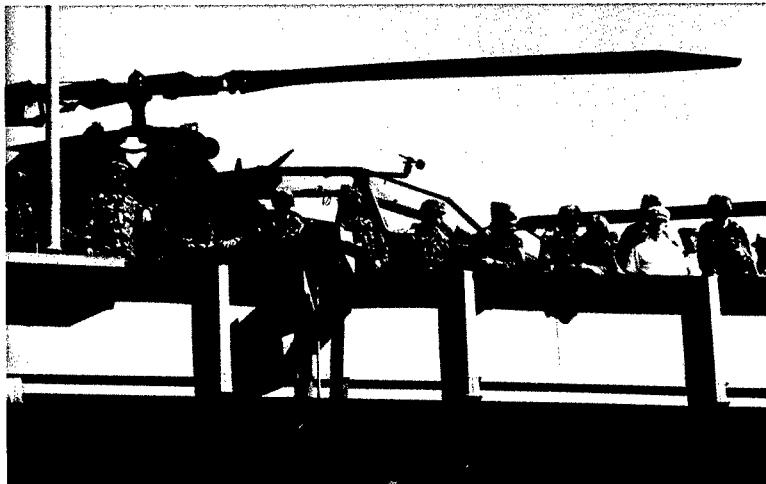
a. Pre-Embarkation Training

- Shipboard and aircraft firefighting training.
- Aviation ordnance training.

b. Embarkation Training. The following requirements will be met as soon as practical after embarking. These training evolutions will be conducted by the ship’s company indoctrination organization.

- Shipboard firefighting training.
- Shipboard electrical safety.
- Storage, handling, and disposal of hazardous or flammable material.
- Hearing conservation.
- Emergency escape breathing device and oxygen breathing apparatus.

Training



Joint force personnel must be thoroughly trained in DLQ requirements.

- Hazards of electromagnetic radiation to ordnance (HERO) and emission control (EMCON) plans.
- Material conditions of readiness.
- Basic damage control organization and embarked aviation detachment responsibilities.
- Abandon ship bill.
- Emergency egress blindfold drill (berthing compartment and workspace).
- Ship's battle bill and man overboard bill.
- General Quarters (with and without flight quarters).

3. Shipboard Deck Landing Qualification Requirements

The following pilot experience, currency, and qualification prerequisites apply to shipboard DLQ training.

- a. **Ground School.** Aircrew assigned to units requiring DLQ training need orientation training in order to ensure their safety and

effectiveness at sea and annual refresher training thereafter. **Initial and refresher shipboard helicopter operations ground school shall be taught by a shipboard-current instructor pilot.** Emphasis will be placed on aircrew coordination with standardized and briefed voice procedures from the crew chief or aircrewman to the pilots on all helicopter clearances with respect to the landing area. Before initial qualification, completion and documentation of training in the following areas are mandatory (see Figure III-1):

- Shipboard hazards.
- Flight quarters organization.
- Launch, recovery, and aircraft movement procedures.
- Aircraft landing and handling signals.
- Deck markings, lighting orientation, and visual landing aids.
- Emergency procedures.
- Communication, EMCON, and navigational aids (NAVAIDs).

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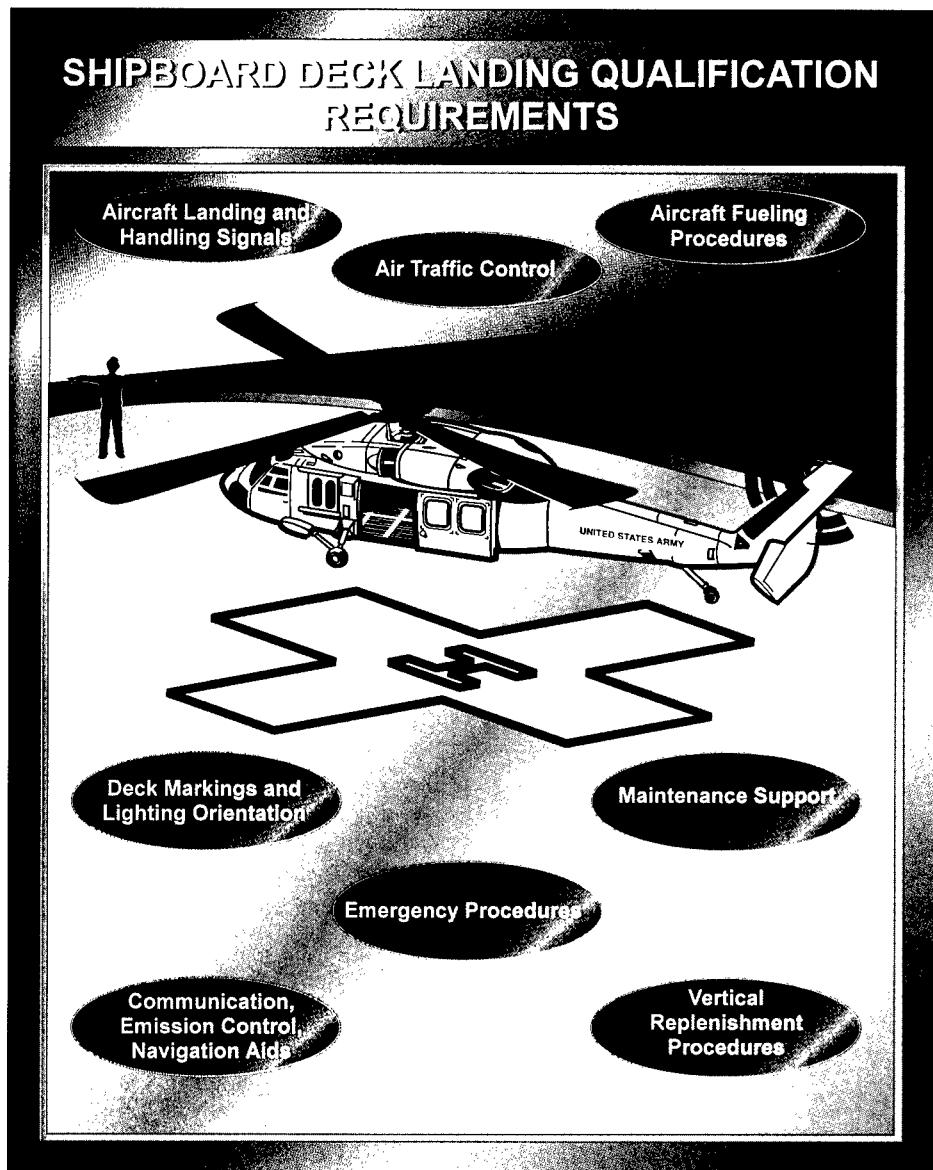


Figure III-1. Shipboard Deck Landing Qualification Requirements

- Aircraft and/or shipboard fueling procedures.
- Air traffic control procedures.
- Maintenance support procedures.
- Vertical replenishment (VERTREP) procedures (if applicable).
- Naval brevity codes and/or flight terminology.
- Marking (color coding) of ship's flight deck personnel.
 - b. Pilots obtain initial, recurrent, and requalification training for type aircraft in accordance with parent Service directives as appropriate.

Training

c. Deck landing qualifications for USCG, USN, and US Marine Corps (USMC) helicopter pilots are listed in appropriate Service publications. **For US Army (USA) and US Air Force (USAF) helicopter pilots, the memorandum of understanding (MOU) between the Departments of the Navy, Air Force, and Army titled “Army/Air Force Deck Landing Operations,”**

provides qualification requirements. Initial qualification and currency requirements for special operations units will be in accordance with (IAW) MOU between Commander in Chief, US Special Operations Command and Chief of Naval Operations.

d. For initial DLQ evolutions, a Service liaison officer qualified as a pilot in the

INITIAL QUALIFICATION AND CURRENCY REQUIREMENTS

1. Single/dual spot (herein after referred to as single-spot) ships:

a. Initial day qualification consists of:

- Flight training conducted by either a USA/USAF DLQ instructor pilot (IP) or a USN/USMC helicopter aircraft commander (HAC) who is current on single-spot decks.
- Ground School training per paragraph 3a above.
- Six field deck landings prior to six single-spot shipboard landings, all within a ten consecutive day period.

b. Currency requirements: Four single-spot shipboard landings within 90 days.

- Pilots whose currency has lapsed, but who have made four single-spot landings within the last 180 days, shall:
 - Undergo training conducted by either a current DLQ pilot-in-command (PC) or DLQ IP.
 - Perform four field deck landings prior to six shipboard landings, all within a ten consecutive day period.
- Pilots whose currency has lapsed and who have not made 4 single-spot landings within the last 181 days shall undergo initial qualification training.

c. Night single-spot helicopter operations require significantly more training and specialized equipment than day operations and may not be conducted except for life-threatening emergencies or operational necessity. Requests for this type of training will not normally be approved. Exceptions will be handled on a case-by-case basis by USN (CNO N889F4) and USA (DAMO-TRS), or USAF (XOOS).

2. Multi-spot ships (LPH/LHA/LHD):

a. Initial day qualification consists of:

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- Flight training conducted by a USA/USAF DLQ IP or unit trainer (UT) who is day current or a current USN/USMC HAC.
 - Ground School training per paragraph 3a above.
 - Five day-field deck landings prior to five day-shipboard landings, all within a ten consecutive day period.
- b. Day currency requirements: four shipboard landings within the preceding nine months. Pilots whose day currency has lapsed shall undergo initial day qualification; requalification shall be conducted by a USA IP, UT, or PC. USAF requalification shall be conducted by a DLQ or current MP, IP, or EP.
- c. Initial night qualification:
- The pilot shall be day-qualified and current.
 - Ground School training per paragraph 3a above.
 - Flight training shall be conducted by a night-current USA/USAF DLQ IP or USN/USMC HAC.
 - Six night-field deck landings prior to six night shipboard landings, all within a ten consecutive day period. Pilots must also comply with the 72 hour requirement of para 2d.
- d. Night currency requirements: six night shipboard landings within the preceding 90 days are required to maintain currency. If more than 72 hours have elapsed since the last night shipboard landing, one day shipboard landing shall be performed within 24 hours prior to the next night shipboard landing.
3. Pilots qualified on single-spot ships are qualified on multi-spot ships, but the reverse is not true.
4. Aircraft carriers: Routine DLQ training and operations normally will not be conducted on CV class ships. Operations on CV class ships will be on a case-by-case basis and require a special ground brief by US Navy personnel, or Army and/or Air Force personnel designated by the Navy to give the briefing. Pilots qualified and current on single- or multi-spot ships shall be considered qualified and current on CV class ships.
5. Pilots performing logistics over-the-shore (LOTS) or VERTREP operations that involve external loads without a shipboard landing shall be deck landing qualified and current. Pilots scheduled to participate in LOTS/VERTREP operations must receive a familiarization of the designated ship by US Navy personnel or a previously familiarized US Army IP/PC or US Air Force IP/Flight Examiner.

designated DLQ helicopter should be present in the ship's HCS to render assistance as required.

e. Prior to DLQ operations, the OIC gives a crash and fire parties brief, including an aircraft walk-around for each type of

Training

participating helicopter. When a crash and fire parties briefing is conducted prior to the arrival of unfamiliar aircraft onboard the ship, a diagram identifying emergency egress and/or access locations, fuel tanks, oil and hydraulic reservoirs, battery location, engine controls, and onboard fire extinguishing systems of the respective aircraft will suffice for briefing purposes.

f. Night vision device ship landing initial qualification. Pilots shall meet the following requirements prior to NVD qualification:

• Initial qualification instructor pilots.

IPs requirements are the same as for initial day qualification. In addition, the IP will be night, NVD, and/or night vision system ship-landing current as required by the type of ship operations anticipated. A USMC instructor shall be a designated night systems instructor.

• Air-capable ships. Night landing to single-spot ACS require significantly more training, and request for this type of operation or training will not normally be approved. Exceptions will be handled on a case-by-case basis by the following offices:

• Navy - Chief of Naval Operations (CNO), Code CNO N889.

• Army - Chief of Staff of the Army, DAMO-TRS.

• Air Force - Chief of Staff of the Air Force, XOOS.

• Amphibious aviation and aviation ships.

• Day currency within 72 hours of commencing night shipboard NVD qualification.

• Five (5) NVD field deck landing practices, or suitable simulator training.

• Night currency.

• Five (5) NVD DLQs within 10 days of initiating night field deck landing practices.

g. NVD Currency. Four (4) NVD ship landings are required within the preceding 6 months. If currency lapses, pilots are required to repeat initial qualification. Prior to executing NVD ship landings for initial and currency qualifications, crews will be NVD-current and qualified in the aircraft conducting training.

Note: NVD-aided qualification and currency does not constitute unaided qualification and currency. If the requirement for unaided night ship operations is anticipated, initial qualification is as described in paragraph 3c above.

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CHAPTER IV

PREDEPLOYMENT

"The man who is prepared has his battle half fought."

Cervantes
Don Quixote, 1605

1. Planning

a. Success of joint helicopter detachments on ships is directly dependent on proper planning. **Operators and planners must understand the capabilities and limitations of ship and helicopter interoperability if the maximum degree of safety, flexibility, and effectiveness is to be realized.** Presail planning must include sufficient lead time to accommodate training and qualification and must be completed prior to conducting shipboard operations. For all shipboard helicopter operations, a presail conference is required under normal circumstances. Conference attendees will include, at a minimum, shipboard and helicopter detachment personnel.

b. Appendix A, "Sample Formats," contains a sample letter of instruction to be used for planning purposes by joint helicopter detachments.

2. Detachment Certification

Before embarkation, helicopter detachments will be certified for shipboard operations by their unit commander or other cognizant authority. This certification will ensure that training requirements set forth in this publication have been met and that the detachment has met parent-Service training requirements for the intended mission(s). Any specific training shortfalls or additional training intended after embarkation should be briefed during the presail conference when applicable and appropriate. **Certification is not required for all training operations that**

do not require embarkation (e.g., deck landing qualification).

a. **Helicopter Specifications.** Prior to operations, and when requested, the detachment OIC will make available diagrams of embarked aircraft to the HCO or air officer (Air Boss) and crash and salvage parties prior to operations. These should include but not be limited to the items shown in Figure IV-1.

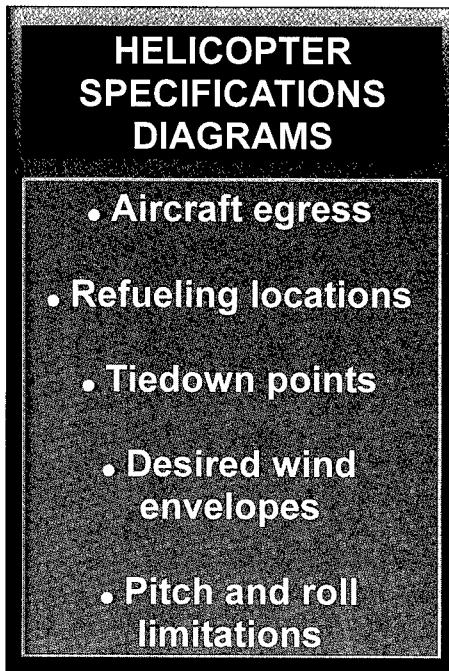


Figure IV-1. Helicopter Specifications Diagrams

b. **Requirements for Aviation Detachment Personnel Assigned to Flight Deck Duties.**

- All personnel will wear prescribed personal protective clothing and

Chapter IV

equipment while on the flight deck during helicopter operations.

- Aviators should attend an instrument refresher training course within the preceding year before participation in shipboard operations.
- Shipboard firefighting indoctrination training is required for flight deck personnel.

3. Corrosion Prevention and Control

The shipboard environment is inherently corrosive. Embarked aircraft will require cleaning and treatment for corrosion more frequently than shore-based aircraft. Detachment OICs must place special emphasis on the importance of a dynamic corrosion prevention and control program and ensure that corrosion prevention and control receive priority for timely accomplishment along with other required maintenance. The frequency and content of a program for cleaning, corrosion control, and preservation of aircraft and support equipment should be established prior to commencing embarked operations.

CHAPTER V

AIRCRAFT DEPARTURE AND RECOVERY PROCEDURES

"A collision at sea can ruin your entire day."

Thucydides

1. Deck Operations

a. The ship's flight quarters checklist needs to be completed before helicopter operations.

b. **Permission for any movement of helicopters must be obtained from the OOD on the bridge**, who will be notified when the move is complete and the aircraft tied down.

c. Some military helicopters do not have rotor brakes or droop stops. Helicopters without rotor brakes or droop stops may operate from shipboard landing decks but should not routinely shut down. Extreme caution must be exercised during all operations (especially during gusty wind conditions) to preclude damage to aircraft or injury to personnel. **All rotor blades will be secured immediately following shutdown.**

d. The OOD will provide the safest deck conditions possible until the helicopters have been secured. **Helicopters are always chocked (if equipped with wheels) when spotted on the flight deck or in the hangar**, except during emergency launch (sea state permitting).

WARNING

Brakes will be set on during all takeoffs, landings, and while on deck, for helicopters equipped with wheels.

e. The deck status lights system includes a light fixture with three lenses or rotating beacons. They are normally located on a high point in the pilot's field of vision and are used to indicate the flight deck's ability to operate

aircraft. Red indicates fouled deck (when the ship is operating airborne aircraft) or clear to start engines (when the ship has aircraft on deck). The Coast Guard uses a single amber signal to indicate clearance for both engine start and rotor engagement. Amber is used for rotor engagement or disengagement, and green indicates clear to launch and recover helicopters. **Deck status lights are normally for communication with flight deck personnel only. Pilots will not use the deck status lights for clearance for engine start, rotor engagement, or takeoff or landing.** Pilots will follow LSE or LSO signals. See Figure V-1 for command and display signals.

WARNING

All anti-collision lighting will be off during all deck operations to ensure that the deck crew's night vision is not impaired. Aircraft position lighting will be as required for operation in progress.

f. Flight crews will request clearance for **start and runup before scheduled takeoff time**. Engines may be started upon LSE or LSO signal.

- **Troubleshooting.** If the helicopter experiences maintenance problems, the pilot will signal for maintenance personnel. Deck crew personnel will determine the nature of the problem and discuss the situation with the pilot in command and inform the LSE, LSO, HCO, or OOD and tower operator when a decision has been made concerning the status of the helicopter.

Chapter V

COMMAND AND DISPLAY SIGNALS				
EVOLUTION	COMMAND	PILOT SIGNAL 1/	SHIP DISPLAY 2/	MEANING 3/
1. Prepare to start engine.	Check tiedowns, chocks, and all loose gear about deck.	Hand signals to LSE/LSO (day).	Red signal in flight deck area.	Verify chocks and tiedowns in place. Boots removed and stowed. Man fire extinguisher.
2. Start engines. 4/	Start engines.	Hand signal to LSE/LSO.	Red signal in flight deck area (USN). Amber signal in flight deck area (USCG).	Authority for responsible flight deck personnel to signal for starting engines. Ship not ready for flight operations.
3. Engage rotors.	Stand clear of helo(s) engaging rotors.	Hand signal. Position lights FLASHING BRIGHT (DIM for night).	Amber signal in flight deck area until rotors are engaged, then red signal.	Ship is ready for pilot to engage rotors. Authority for responsible flight deck personnel to signal for rotor engagement if immediate area clear. Ship restricted from maneuvering and winds within engagement limits. Ship not ready for flight ops.
4. Ready for launch.	Obtain permission from bridge for green deck.	Thumbs up to LSE/LSO (day). Position lights STEADY BRIGHT (DIM for night). May give "thumbs up" signal by turning on flashlight or other movable light and moving it up and down (USCG) (night).	Red signal in flight deck area.	HCO/LSO request green deck from bridge. Ship maneuvers to obtain winds for launch. Pilots finish checklist.

Figure V-1. Command and Display Signals

Aircraft Departure and Recovery Procedures

COMMAND AND DISPLAY SIGNALS				
EVOLUTION	COMMAND	PILOT SIGNAL 1/	SHIP DISPLAY 2/	MEANING 3/
5. Launch.	Remove all tiedowns on pilots signal. Launch helo(s).	Hand signal to remove chocks and chains.	Green signal in flight deck area.	Ship is ready in all respects for flight ops. Ship is established on flight course and restricts maneuvering. Bridge grants green deck. Wind is within launch envelope. Authority granted to pilot in command to signal removal of chocks and chains. Authority for LSE/LSO to launch helo when chains are removed.
6. Ops normal report.	Secure from flight quarters.	OPS NORMAL radio call from pilot unless prohibited by EMCON, then a ship fly-by with the landing light turned ON prior to departing area.	As appropriate.	Helo system functioning correctly. Commencing assigned mission.
7. Helo(s) inbound for landing.	Prepare to land helo(s).	None.	Red signal in flight deck area.	Prepare designated landing area to land helo(s). Ship not ready to recover helo(s).
8. Recovery.	Land helo.	None.	Green signal in flight deck area.	Ship is ready in all respects to land helo(s). Wind is within recovery envelope.

Figure V-1. Command and Display Signals (cont'd)

Chapter V

COMMAND AND DISPLAY SIGNALS				
EVOLUTION	COMMAND	PILOT SIGNAL 1/	SHIP DISPLAY 2/	MEANING 3/
9. Prep. for shutdown.	None.	Hand signal to disengage (day). Flash position lights (night).	Red signal in flight deck area.	Once chocks and chains are installed, ship is free to maneuver. Pilot signals when ready to disengage, and ship obtains appropriate winds over deck.
10. Disengage rotor.	Stand clear of helo. Disengage rotors.	None.	Amber signal in flight deck area until rotors stopped, then red signal.	Authority for responsible flight deck personnel to signal to disengage rotors when area is clear. Winds within disengagement envelope. Ship restricted from maneuvering until rotors have stopped.
1/ Pilot and LSE hand signals from Appendix F. Ship specific signals between aircraft and ship should be briefed prior to commencing flight operations. These include, but are not limited to, night signals using aircraft navigation and position lights. 2/ Deck status lights convey a condition met throughout the ship in preparation for a certain flight evolution. However, final clearance for a specific task depends upon mutual coordination among pilot, officer of the deck, HCO or LSO, and LSE. 3/ NVD deck signals are coordinated via sound powered telephone circuits or ICS COM. 4/ Some helicopters engage rotors simultaneously with engine start.				

Figure V-1. Command and Display Signals (cont'd)

- Communications.** All necessary communications systems checks should be accomplished before requesting clearance for takeoff.

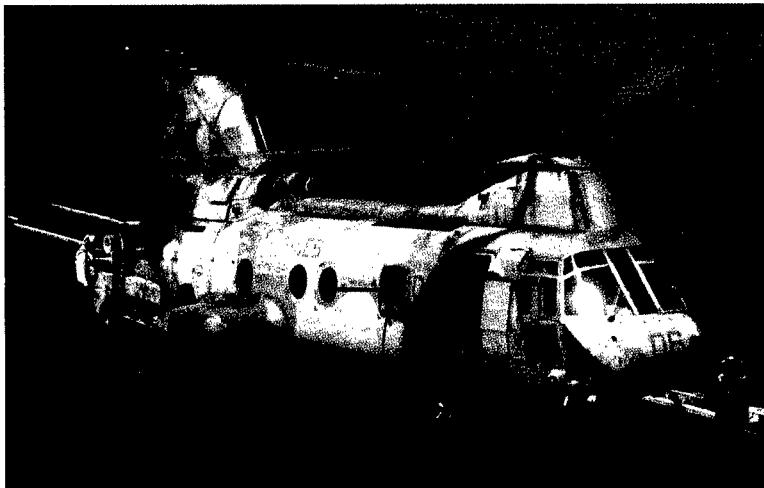
WARNING

Under no condition will helicopters be ground taxied onboard ships.

- Navigation and Sighting Equipment.** Navigation and sighting system alignment and stabilization can be accomplished before launch.

g. When all prelaunch checks are complete and the pilot is ready for launch, the pilot signals the LSE, LSO, or HCO by transmitting a request for takeoff to the HCS or primary

Aircraft Departure and Recovery Procedures



Movement of helicopters on the deck is controlled by the OOD on the bridge.

flight control tower and by turning the aircraft's navigation lights to steady-bright (steady-dim at night, if able). **When takeoff clearance is granted and all tiedowns have been removed, the pilot is cleared to take off at LSE or LSO signal.** The pilot should perform a hover power check before leaving the deck to ensure that sufficient power is available for flight. Once the helicopter has cleared the flight vicinity of the helicopter launch and recovery area, the pilot will signal or report "ops normal" to the tower or helicopter direction center, provide the number of souls on board, and give the total fuel remaining state in hours and minutes unless prohibited by operational or tactical restrictions. Determination of the fuel state will be the time that engine "flame out" (fuel exhaustion) can be expected. If the aircraft is leaving the tower's control, this report will be given to the CIC or HDC. The CIC or HDC will maintain a record of the fuel state of each helicopter during each flight.

h. If required, the aviation unit will provide NVDs to the ship for use during NVD operations.

i. Flight quarters should be set before the scheduled recovery time or in sufficient time to allow for recovery of all helicopters before the fuel state of any helicopter reaches 30 minutes fuel remaining. When a helicopter is operating near a ship or ships, at least one ready deck will normally be kept available in the event that the helicopter needs to conduct an emergency landing.

- Under VMC, aircraft will contact the tower no later than 5 miles inbound for landing instructions. Upon check-in, aircraft should expect to receive BRC, ship's speed, wind, altimeter, deck pitch and roll information, and clearance into the landing (Charlie) pattern or a holding (Delta or Plane Guard) pattern.
- Clearance to land will be obtained from the helicopter control station or primary flight control tower before final approach. Shipboard landings will be performed with aircraft parking brakes set and nose wheel or tail wheel locked, if applicable. Recovery spot configurations are depicted in Annex D to Appendix B, "Control Areas and Approach Charts."

Chapter V

WARNING

While aircraft are landing, all nonessential personnel will remain clear of flight deck landing area.

- All ship lighting that may affect the safe operations of NVDs will be filtered or extinguished. Aircrews will identify lighting hazards to the helicopter detachment OIC or ship's personnel immediately.

j. Night launch and recovery operations are the same as for day operations except that the volume and speed must be reduced. Helicopters without instrument flight capability should not be flown at night unless operational conditions require it. During night flight operations, optimum wind, pitch, and roll conditions will be provided for launch and recovery evolutions.

- Shipboard lighting systems are depicted in the Naval Air Warfare Center, Aircraft Division (NAWCAD), Lakehurst, NJ, Shipboard Aviation Facilities Resume. A stabilized glide slope indicator (SGSI) is provided on most air-capable ships to aid night shipboard landings.
- The LSE will use lighted wands.
- Flight deck personnel will use a clear lens in goggles.

k. Night Vision Device Operations

• NVD operations are authorized and should be conducted in accordance with the ship's helicopter operating procedures and the aircraft's parent Service directives. **The use of NVDs may require emission control, blacked-out operations that include start-up, launch, and recovery, and various approaches and maneuvers.** All nonstandard NVD operations will be thoroughly briefed to the ship's CO and Air Officer. The unique nature of these operations requires a higher degree of coordination and planning between aviation units and ship's personnel.

WARNING

If the ship's stern position light significantly impairs aircrew ability to safely conduct NVD operations, it will be extinguished during flight operations. Flight deck edge lights are required to be on, at minimum intensity, during NVD DLQ and other exercises where NVDs will be used during flight operations.

1. **Ordnance Loading and Downloading.**
See Chapter VI, "Aviation Ordnance."

2. Flight Operations

See Figure V-2.

a. Helicopter Readiness Conditions.

Flight crews assigned alert conditions will be notified early enough to permit normal preflight inspection, start, warm-up, and completion of the takeoff check list. Alert conditions will be defined by the JFC in the OPORD.

b. Air Traffic Control Procedures.

Weather in the ship's control area or zone is the most prominent factor affecting the degree of aircraft control necessary. The type of aircraft control to be employed during departures and recovery is determined by the ship's CO unless otherwise specified by higher authority. Helicopters may be required to operate under positive control. The controlling agency will establish radar and radio contact with the aircraft being controlled. The aircraft will comply with published approach or departure procedures.

Aircraft Departure and Recovery Procedures

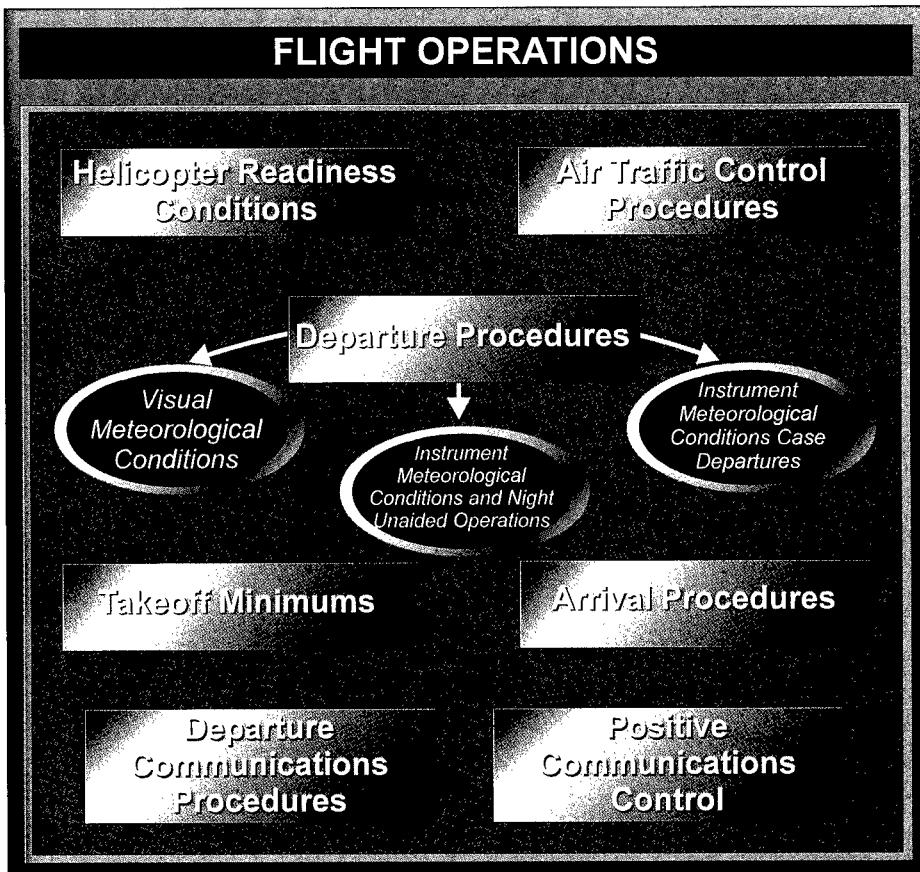


Figure V-2. Flight Operations

Positive control of helicopters will be used under the following conditions unless otherwise prescribed:

- Ceiling less than 500 feet above ground level.
- Forward flight visibility less than 1 mile.
- All flight operations between 1/2 hour before sunset and 1/2 hour after sunrise except for Coast Guard cutters and as modified by the operational commander or ship's commanding officer.

c. All helicopters will be under positive communications control at sea unless otherwise directed. Pilots will not shift frequencies without notifying and/or

obtaining permission from the controlling agency.

d. Departure Procedures

- **Visual Meteorological Conditions.** Helicopters will clear the control zone at or below 300 feet or as directed by the tower or HCO. When IMC are not anticipated during departure and subsequent rendezvous, it is known as a "Case I" departure.
- **Instrument Meteorological Conditions and Night Unaided Operations.** The helicopter will depart on the stipulated departure course, climbing to a minimum of 300 feet before commencing a turn, unless otherwise directed.

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- **IMC Case Departures.** Aviation and amphibious aviation assault ships normally engage in multi-aircraft operations. Departures are coordinated in accordance with the following.
 - **Case II.** Weather at ship not less than 500-foot ceiling and 1 mile visibility. Helicopters will depart via Case I departure and remain below the clouds. If unable to maintain VMC, helicopters will proceed in accordance with Case III.
 - **Case III.** Weather conditions at the ship are below Case II minimums or when directed by the commanding officer. Helicopters will launch at not less than 1-minute intervals, climb straight ahead to 500 feet, and intercept the 3-mile arc in the direction given by control. At the 3-mile point, helicopters will arc to intercept the assigned departure radial. Upon reaching the assigned departure radial, departure helicopters shall turn outbound and commence climb to assigned altitude. Both ship and helicopter must be equipped with TACAN to execute a Case III departure. If either is not TACAN equipped, then the procedure (and weather conditions) in the Case II paragraph above applies. Helicopters should be IMC-equipped to fly during Case III conditions.
- e. **Takeoff Minimums.** Takeoff is authorized in weather conditions down to published minimums for the available instrument approach or parent Service regulation. Takeoff minimums may be determined using approach minimums for an approach to another ship within the operating range of the helicopter if the alternate ship is at flight quarters or on alert for short-notice operations. Positive control must be available for all operations conducted in weather below 500-foot ceiling, 1 mile visibility.
- f. **Departure Communications Procedures.** The helicopter will launch with radios tuned to predetermined frequency and will be under the control of the CIC, HDC, or CATCC immediately following launch. If operating aircraft are not NVD-or IMC-equipped, the aircraft will not be required to change frequencies or identification, friend or foe (IFF) codes until at least a 300-foot altitude and level flight configuration have been attained.
- g. **Arrival Procedures**
 - Inbound helicopters will check in with the CIC, HDC, or CATCC upon entering the control area (50 miles, if able) and provide the following information:
 - Call sign
 - Position (relative to the ship)
 - Altitude
 - Fuel state
 - Souls on board
 - Other pertinent information that might affect recovery. (See Chapter VI, "Aviation Ordnance," for procedures to follow with hung or unexpended weapons.)
 - **Visual Flight Rules Descent and Approach.** If descent and approach can be accomplished in VMC, the pilot will be passed to primary flight control (PriFly) or HCS (both equivalent to a control tower) at 5 miles, and the LSE or LSO shall aid in recovery. Aboard aviation ships and amphibious aviation assault ships, helicopters will possibly be held in Delta or Plane Guard patterns

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before final landing clearance. The starboard (right hand side) Delta Pattern for all ships is flown at 300 feet between the 045 and 110 degree radial relative to the BRC. Occasionally, a port (left hand side) Delta may be assigned and is flown in a similar fashion on the port side of the ship.

• Standard Helicopter Landing Patterns: (1) The standard landing pattern (**Charlie pattern**) is the Case I VMC helicopter landing pattern. The landing patterns for all ship types are essentially the same. Principal differences to plan for are flight deck elevations and obstructions in proximity to the landing area that become factors in transitioning from the approach to landing profile. The Charlie pattern is flown at 300 feet at 80 knots indicated airspeed. The landing approach starts not later than on the downwind leg abeam the intended point of landing. The left or right turn to final will be made to intercept the 45 degree line at the 90 degree position for ships with offset landing centerlines, or to intercept the ship's wake for an up-the-stern final approach. The approach is then continued straight in to the spot for landing. Annex B-A depicts the typical landing pattern and control zones and restrictions for the amphibious assault ship as well as the landing platform helicopter, general purpose amphibious assault ship, and/or general purpose amphibious assault ship (with internal dock) class ships, which is a slight modification to the approach used for smaller, single-spot ships. Landing a helicopter on a spot to the immediate front of another helicopter should be avoided whenever possible.

WARNING

When helicopters approach on the 45 degree bearing to land immediately in front of a spot occupied by another helicopter (on LHD/LHA/LPH class ships), rotor clearances (main and tail) between the two aircraft during the final portion of a 45 degree approach are significantly reduced.

(2) When approaching a spot immediately in front of a spot occupied by another helicopter, the final portion of the approach on the 45 degree bearing should terminate at a point directly abeam the intended landing spot. From this point the final transition is flown by sliding sideways to a hover over the landing spot. The landing should be made by the pilot in the right seat. (3) The Charlie pattern and the Helicopter Night Case I recovery pattern are the standard Case I night helicopter landing patterns. The air officer shall ensure that all airborne aircraft and the squadron duty officer are informed when changing from one night landing pattern to another. Simultaneous use of the Charlie and the Night Case I recovery patterns is not authorized. (4) On multi-spot ships, completion of the night recovery pattern depends on the location of aircraft and other obstructions on the flight deck. If the landing spots aft of the assigned landing spot are clear, the helicopter may complete a straight-in approach over the stern and air-taxi to the landing spot. When there are obstructions between the stern and the landing spot, the air officer shall direct the pilot to adjust the pattern to fly close aboard the port side and intercept the 45 degree lineup for the assigned landing spot.

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- **Instrument Flight Rules (IFR)**

Approach Procedures. Helicopter operations are not normally conducted when weather is below a ceiling of 500 feet and/or less than 1 mile visibility, unless a carrier-controlled approach (CCA) or precision approach radar (PAR)-equipped facility is available within the operating range of the helicopter. ACS primarily use TACAN or nondirectional beacon (NDB), if equipped, for approaches under instrument conditions. (See Appendix B, "Control Areas and Approach Charts.") The emergency low visibility approach (ELVA) and the smokelight approach are available for use under emergency conditions when a CCA or PAR-equipped facility is not available and weather at the ship is below minimums for TACAN or NDB approaches. (See Figures B-C-1, B-C-2, and B-C-3 for ELVA patterns, smokelight procedures, and emergency marshal patterns.)

Note

NDB **approaches** are based on very high frequency (VHF) or direction finder UHF and/or direction finding (DF) equipment. Aircraft must be properly equipped to conduct VHF or DF approaches to use the NDB overhead approach.

• **Case Arrivals.** Arrivals to aviation and amphibious aviation assault ships are divided into the following cases. (1) **Case I.** Visual Descent and Approach. Weather minimum 1000-foot ceiling and 3 miles visibility. Pilots will report "ship in sight" when visual contact is made with the ship. The HDC approach control will switch the helicopter to the tower at 5 miles for landing clearance. (2) **Case II.** Controlled Descent and Visual Approach. Weather minimum 500-foot ceiling and 1 mile visibility.

Positive control will be used until the pilot reports "ship in sight." The HDC or approach control will be ready to assume control of Case III recovery if the weather deteriorates below Case II minimums. (3) **Case III.** Case III will be used whenever weather conditions at the ship are below Case II minimums and at night unless otherwise directed. A straight-in, single-frequency approach will be provided in all cases. Precision radar will be used whenever available. Marshal information is assigned using TACAN approach charts. Pilots will adjust patterns to depart the marshal at the assigned expected approach time. When the pilot is established on final approach course, heading and glide slope information will be passed, if available.

• **Visual Landing Aids. Availability of visual landing aids by ship type will be depicted in the ship's facility resume.** (See NAWCAD-ENG-7576, "Shipboard Aviation Facilities Resume.") (1) **Stabilized Glide Slope Indicator.**

The SGSI (Figure V-3) provides a single bar of green light (1-1/2 degrees), amber light (1 degree), or red light (6-1/2 degrees). The color of the light indicates whether the aircraft is above (green), below (red), or on (amber) the proper glide slope. An aircraft executing an SGSI approach would normally intercept the glide slope path at an altitude of 350 feet and a distance of 1 mile, and should fly the amber-red interface. (2) **Horizon Reference System (HRS).** The HRS is a 10 foot electroluminescent bar designed to be used in the deck environment to provide an artificial horizon during night operations. (3) **Fresnel Lens Optical Landing System (FLOLS).** FLOLS is installed aboard CV-class ships. It is an electro-optical gyro-stabilized pilot landing aid. The system presentation is a central amber

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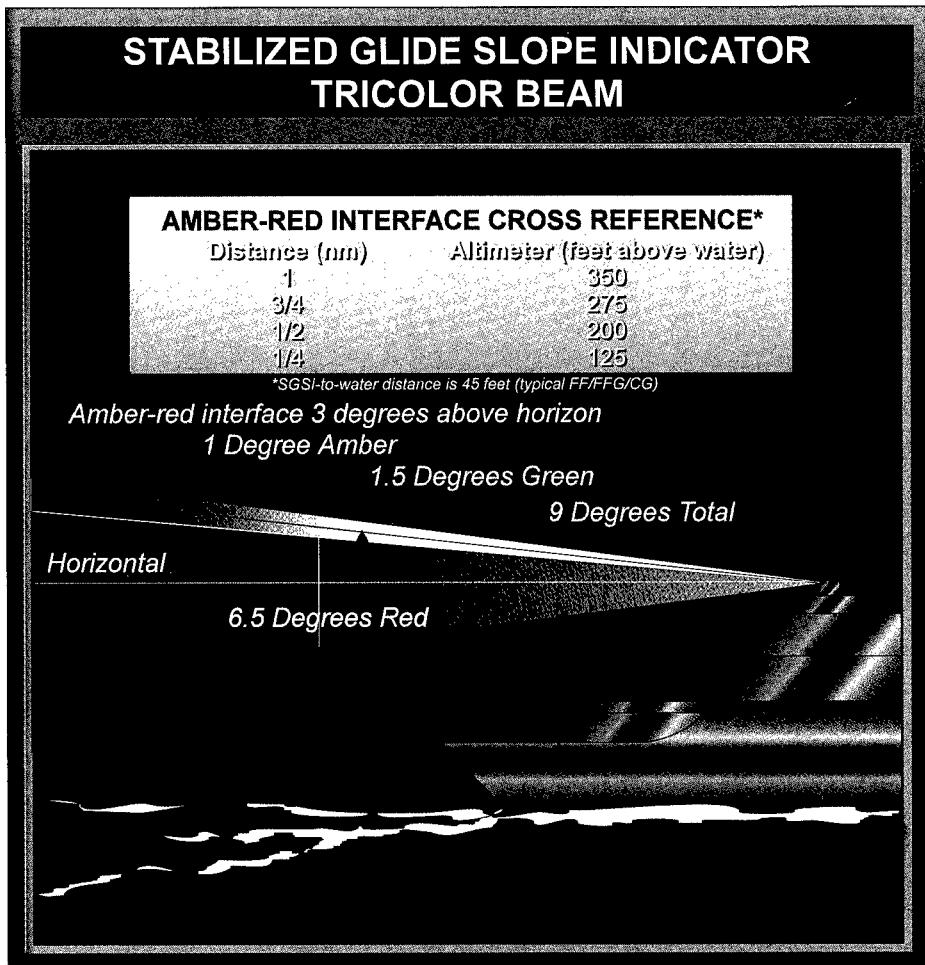


Figure V-3. Stabilized Glide Slope Indicator Tricolor Beam

light (ball) and a green cross bar (datum). The position of the ball relative to the datum line is indicative of the aircraft position relative to the selected glide slope.

- The Vertical/Short Takeoff and Landing Optical Landing System (V/STOL OLS) provides glideslope and trend information to a pilot approach to a hover. The display is mounted above the deck on the aft end of the island. Pitch and roll stabilization compensates for as much as 3 degrees of the ship pitch and 14 degrees of roll. When the indicator amber ball of light is lined up with the

two green datum bars, the pilot is on the proper glideslope. The on-glideslope indication is set for 3 degrees to bring the aircraft to the ship's ramp with the pilot's eye approximately 50 feet above the deck on tramline.

- The indicator display is also light coded. The lighting code defines the upper and lower limits of the indicator display, allowing the sensing of these limits by going from a normal amber brightness to a brighter, non-flashing, then flashing amber, when tending to go out of the top of the display or to a brighter, non-flashing, then flashing red when tending

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towards the bottom of the display. The 20 degrees horizontal display is oriented so that the pilot is not distracted by the V/STOL OLS indicator display as the aircraft crosses the ramp on the approach line. At this point, the pilot will lose the V/STOL OLS indicator and transitions to the final phase of recovery.

3. Specific Mission Area Operations

Specific mission area operations or specific tactics between USA, USN, USMC, USAF, and USCG helicopters may be further delineated in tactical memorandums. These documents are specific in scope and are to be used in conjunction with this publication.

4. Emission Control

When the use of radio communications is not authorized because of the EMCON condition in effect, routine helicopter operations may be conducted by the use of visual signals. Helicopter control ships will notify receiving ships by visual means that helicopter operations will be conducted with sufficient lead time to ensure that the receiving ship will be ready for helicopter arrival. Large cards displaying the ship's tactical call, communication frequency, and hull number will be used by the control ship to inform the helicopter pilot of the destination and bearing and distance (pigeons) to the aircraft

SIGNAL FLAG DISPLAY		
Evolution	Signal Flag Display	Meaning
1. Setting "helicopter detail"	HOTEL (HOTEL ONE) at the dip (1/3 mast)	<i>Ship is preparing to conduct helicopter operations. Display a red signal in the helo ops area</i>
2. Ready to conduct helicopter operations	HOTEL (HOTEL ONE) closed up (full mast)	<i>Ship is ready to conduct operations. Display a green signal in helo ops area</i>
3. A delay or interruption of the evolution	HOTEL (HOTEL ONE) at the dip (1/3 mast)	<i>A temporary delay in ops. The landing signal enlisted will give a waveoff to the helo and a red signal will be displayed in the helo ops area</i>
4. Heli operations are complete	HOTEL (HOTEL ONE) hauled down (no flag)	Ops (transfer) are complete
HOTEL FLAG (HELO OPS)		
	White	Red
NOTE: HOTEL flag is displayed on the ship's mast		

Figure V-4. Signal Flag Display

Aircraft Departure and Recovery Procedures

destination. Signals shown in Figure V-4 and Appendix F, "Aircraft Handling Signals," will be used for helicopter operations. The controlling ship will guard the helicopter frequency, and radio transmissions will not be authorized unless safety of flight or an emergency situation requires violating EMCON.

a. **Visual communications are extremely important to joint shipboard helicopter operations.** Proper use of the HOTEL flag, deck status lights, and flight deck status signaling system lamp signals are a valuable backup to radio communications. In the event of radio failure, routine helicopter missions can be completed by the use of visual signals.

b. An overdue helicopter, unplanned position and intended movement change, rapidly deteriorating weather, or other safety-of-flight factors justify termination of the prescribed peacetime EMCON condition until the cause for termination is no longer a factor. The ship will be prepared to operate radar, TACAN, and radios on short notice.

- **Launch.** During communications-silent launch operations, aircrews will communicate with the LSE, LSO, or HCO (if required) via intercom or light signals. The LSE or LSO will then relay information to the tower or helicopter control station.

- **Recovery.** During communications-silent recovery operations, aircrews will follow flashing ship's position lights and/or mast lights.

- **LSE or LSO.** The LSEs or LSOs should be present during NVD operations. The LSEs or LSOs should use infrared chemical lights or NVD-compatible light wands. The signals of "wave off" or "hold" are still mandatory. When LSEs or LSOs are not required, they may be used as safety observers.

5. Military Air Distress Frequency

Officers in tactical command (OTCs) will include in their communications plan the requirement that all ships with helicopters operating will monitor the UHF Guard or military air distress frequency. This will allow a pilot out of UHF range with the controlling ship to attempt to communicate with any monitoring ship in the event of an emergency.

6. General Fueling Procedures

Helicopter fueling operations on ships are classified as either cold refueling (engines off) or hot refueling (rotors turning or engines operating). Cold refueling may be accomplished by pressure or gravity. Hot refueling is limited to pressure fueling only.

- **Type of Fuel.** To reduce the hazard of shipboard fires, only fuel with a flash point above 140 degrees fahrenheit is permitted to be stored aboard ships. JP-5 meets Navy requirements and is naval aviation's standard fuel. Helicopters containing any fuel other than JP-5 will not be hangared or defueled into the ship's fuel system until the helicopter's fuel flashpoint is raised to 140 degrees fahrenheit. For exceptional circumstances, procedures for hangaring helicopters with other than JP-5 may be found in NAVAIR-00-80T-106. The following procedures should be used to raise the flashpoint to the desired level:

- **Preferred procedure.** Defuel helicopter completely and refuel with JP-5. Ships have limited ability to handle hazardous waste; therefore, this procedure should be done ashore prior to embarking on the ship.

- **Alternate method.** Helicopter should burn down to minimum fuel and refuel with JP-5 after landing.

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Neither procedure is guaranteed to raise the flashpoint. The ship will take fuel samples and determine flashpoint prior to hangaring the helicopter. It may be necessary to repeat the procedures several times.

b. Hot Refueling Aircraft with Ordnance. Aircraft with ordnance are not normally hot refueled onboard ships. When all required HERO precautions have been met, the ship's CO may authorize ordnance-equipped helicopters to be hot refueled when required by operational necessity, as defined by the glossary of this publication.

c. Aviation Fuel Handling Precautions

- Do not handle aviation fuel in open containers.
 - Dispose of fuel-soaked rags as soon as possible and in accordance with ship's hazardous waste disposal plan.
 - Only explosion-proof flashlights may be used in spaces with aviation fuels.
- Do not discharge aviation fuel or any hazardous waste overboard without permission of the ship's CO.
 - In the event of a fuel spill, the fueling process should be stopped and the fuel spill cleaned up immediately. Notify the OOD (on air-capable ships) or aircraft handler (on AAAS or aviation ship [AS]) following any aviation fuel spill.
 - Smoking and open flames are not permitted within 50 feet of aviation fuel service systems.
 - Avoid breathing aviation fuel fumes.
 - Fuel will not be issued for any purpose other than fueling.
 - Wash skin with soap and fresh water as soon as possible if it comes into contact with aviation fuel.
 - Eye protection is required when handling aviation fuel.

CHAPTER VI

AVIATION ORDNANCE

"It is firepower, and firepower that arrives at the right time and place, that counts in modern war."

B.H. Liddell Hart
Thoughts on War, 1944

1. Purpose

This chapter amplifies the information provided in NWP 3-04.1M, "Helicopter Operating Procedures for Air Capable Ships," CV naval air training and operating procedures standardization (NATOPS), and LPH/LHA/LHD NATOPS when engaged in supporting joint shipboard aviation ordnance evolutions, and provides the ship's CO and aviation detachments with predeployment requirements and standing operating procedures when operating helicopters from USN and USCG vessels. The necessity to train for and conduct combat operations requires the acceptance of certain risks that cannot be avoided in the handling of explosive weapons. Because weapon-handling evolutions introduce risk, they require careful planning and preparation. **Commanding officers will continually weigh the requirement to conduct each weapon evolution against additional risk being interjected and accept only those evolutions in which the need clearly outweighs the risk.** Procedures prescribed are not intended to be all-inclusive, but rather a reference guide to be used by embarked helicopter detachments when assigned to and operating from USN and USCG vessels. All publications and technical manuals referenced are official directives as depicted in NAVSEA OP-4, "Ammunition Afloat." Deviations from stowage and compatibility requirements aboard USN ships will not occur without prior approval of a waiver or exemption by the CNO. All requests for waivers or exemptions will be submitted IAW Chief of Naval Operations Instruction (OPNAVINST)

8023.20 (series) via the appropriate chain of command and Commander, Naval Sea Systems Command (COMNAVSEASYSCOM), for approval.

2. Introduction

The movement, handling, and stowage of explosive ordnance carried aboard ships and aircraft is inherently dangerous. Therefore, shipboard handling and stowage of explosives and ammunition are governed by the most definitive and restrictive Department of Defense (DOD) regulations and precautions. (See Appendix D, "Ordnance," for permissible stowage matrix.) Because of the confined environment onboard ship, what might be considered a relatively minor explosive incident ashore could be catastrophic underway. Safety must not be jeopardized by the introduction of weapons not designed for shipboard environment nor the reliance on personnel unfamiliar with the shipboard environment. The destructive capacity of explosives has the potential to severely cripple or destroy a ship and its company in seconds. It is therefore imperative that authorized safety procedures be exercised at all times by qualified and certified personnel involved in ordnance handling and stowage operations, and only weapon systems approved for shipboard use are used (inert warheads will be used to the maximum extent possible during training). Safety is the responsibility of all levels of command, and understanding the risk is paramount. Sound knowledge and a healthy respect for ordnance operations will help ensure that safety requirements are met.

Chapter VI

The following describe the essential elements in ensuring safe shipboard aviation ordnance operations:

a. Weapon System Explosive Safety Review Board (WSESRB). The WSESRB, designated by the CNO, reviews safety aspects of weapons or explosive systems and makes recommendations to the CNO and the originating Service regarding acceptance or rejection for use on USN ships. Naval Sea Instruction (NAVSEAINST) 8020.6 (series), “Weapon System Explosive Safety Review Program,” describes the WSESRB program. The WSESRB is headed by a representative of COMNAVSEASYSCOM (SEA-06) and staffed by safety representatives of other naval commands. Service representatives participate as required. **All weapon systems and launch platform weapon control systems employed on ships will be reviewed by the WSESRB before their use aboard ship.** WSESRB responsibilities include review of all mechanical, chemical, biological, and electrical hazards associated with a weapon system. NAVSEAINST 8020.6 (series), “Weapon System Explosive Safety Review Program,” provides a list of information and data required for consideration by the WSESRB.

b. NAVSEA OP-4, “Ammunition Afloat,” is a document that prescribes the minimum safety requirements and regulations for the issue, receiving, handling, stowage, surveillance, maintenance, and return of conventional ammunition along with the preparation of associated reports by units afloat and their certification.

c. Commander, Naval Air Systems Command (COMNAVAIRSYSCOM). CNO has directed that COMNAVAIRSYSCOM review all loading procedures and checklists. COMNAVAIRSYSCOM, through messages, notices of ammunition reclassification, and technical publications, places restrictions on the use of munitions (live

or inert) for operations ashore and afloat. Restrictions are applicable to all Services aboard naval vessels.

3. Responsibilities

Ships designated to support helicopter detachments involving aviation ordnance will provide approved stowage areas, security, and appropriate armament weapons support equipment (AWSE). Qualified and certified aviation ordnance safety supervisors, as identified in paragraph 5, will support all evolutions involving movement or use of aviation ordnance munitions and associated materials. Each Service is responsible for ensuring that the WSESRB has completed review of all munitions assigned to the mission.

a. The ship’s CO is responsible for the following:

- Providing safe ordnance operations and verification of helicopter detachment and personnel ordnance certifications.
- Maintaining a technical publications library of aviation ordnance handling, safety, and security publications, checklists, and associated Navy type command instructions, as listed in Annex B of Appendix D, “Ordnance.” These publications will normally be made available as a predeployment package by the type commanders (TYCOMs).
- Stowing all ammunition in accordance with NAVSEA OP-4, “Ammunition Afloat” and, if required, submitting waivers for stowage of ammunition and obtaining approval prior to loading on board.
- Verifying that all ordnance for use by the helicopter detachment has been approved by the WSESRB and reported to the TYCOM on initial receipt of all ammunition

Aviation Ordnance

brought aboard for the aviation detachment. Monthly reports reflecting air detachment inventory will be submitted until the detachment departs. A final report will then be submitted.

- Ensuring that a HERO or EMCON bill is promulgated before arrival of a helicopter detachment. Commanding officers will ensure that electromagnetic radiation hazards that have the potential to affect electro-explosive ordnance devices, fuel, and assigned personnel are controlled during shipboard helicopter operations. The ship's HERO or EMCON bill should depict individual HERO or EMCON conditions to be set before each specific operational condition (e.g., arming or de-arming, aviation ordnance movements, fueling operations).
- Establishing an aviation ordnance qualification or certification board in accordance with Appendix D, "Ordnance," to certify the combined ship or detachment aviation ordnance team (USA and USAF only). When a USMC detachment is onboard, qualification or certification will be maintained in

accordance with current USN and USMC programs.

b. Helicopter Detachment Responsibilities.
The detachment OIC is responsible to the ship's CO for safe aviation ordnance operations as they relate to the helicopter detachment.

- Helicopter detachment personnel will use parent-Service and WSESRB-approved aircraft system checklists and ordnance loading and downloading procedures.
- The OIC is responsible for the qualification of assigned detachment personnel to conduct aviation ordnance operations aboard ship. The detachment is also responsible for assisting the ship's ordnance personnel in the handling and movement of aviation ordnance and related materials from the ship's magazines to designated assembly, staging or ready service, or flight deck areas as appropriate.
- The OIC is responsible for providing the ship with an ammunition embarkation plan that identifies the types, quantities, number of pallets, weight, and cube of



Helicopter detachments are responsible to the ship's CO for safe ordnance operations.

Chapter VI

ammunition. The OIC will present qualification or certification documentation to the ship's CO when requested.

- The OIC is responsible to provide an inventory of all personal and individual weapons.
- The OIC, upon receipt of the WSESRB list of approved weapons and explosives, will certify to the ship's CO that all detachment ordnance meets WSESRB requirements for shipboard operations.
- The OIC will comply with the ship's qualification or certification board in accordance with Appendix D, "Ordnance," to certify the combined ship or detachment aviation ordnance team (USA and USAF only). USMC detachments will comply with current directives.

4. Personnel Qualification and Certification

All ordnance personnel handling aviation ordnance will be qualified and certified in the applicable families of explosives. The ship's ordnance qualification and certification board will certify the ship and validate the embarked detachment's aviation ordnance handling teams. When the detachment is provided from the USMC, current directives provide adequate guidance for the administration of this program. However, when the detachment is comprised of USA or USAF personnel, Appendix D, "Ordnance," will be used to qualify and certify personnel.

5. Aviation Ordnance Safety Supervisors

The aviation ordnance safety supervisor (AOSS) is the direct representative of the

ship's CO. The AOSS responsibilities are described in Figure VI-1.

6. Conventional Weapons Safety Assistance Teams

There are two conventional weapons safety assistance teams; one is assigned to the Pacific Fleet and one to the Atlantic Fleet. These teams are composed of specially trained and experienced ordnance personnel who provide assistance to fleet activities in all areas of conventional ordnance handling, stowage, and safety. The teams are available to make visits to commands during aviation ordnance evolutions and predeployment training involving ordnance. Their assistance will be requested by individual units requiring or desiring assistance in any operational or training ordnance evolution. Requests for assistance visits should be submitted to the appropriate combatant commander. See Commander in Chief, Atlantic Fleet Instruction 8020.2 (series) and Commander, Naval Surface Force, US Pacific Fleet Instruction 8023.1 (series).

7. Weapons Handling and Movement

The number of personnel engaged in ammunition handling operations will be limited to the minimum necessary for safe and efficient performance of work. Ship or detachment personnel certified by the ship's CO are responsible for the movement of ordnance from a ship's magazine to designated assembly and buildup areas (detachment aviation ordnance personnel may assist as necessary). Aviation ordnance detachment personnel are required to handle and move all weapons from assembly and buildup areas to aircraft and return to assembly or buildup area.

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AVIATION ORDNANCE SAFETY SUPERVISOR RESPONSIBILITIES
...be assigned by the combatant commander and provided by the appropriate type commander
...be a qualified and certified shipboard aviation ordnance safety supervisor (E-6 or above)
...be thoroughly familiar with the provisions of this and all other instructions promulgating explosive safety regulations
...act as a staff adviser to the ship's commanding officer on matters relating to aviation explosive safety and be a member of the ship's aviation qualification and certification board
...act as a safety observer and not assist in loading, arming, or other ordnance evolutions
...act, in the absence of an ordnance officer, as the senior Naval enlisted aviation ordnance person
...have no authority to waive or alter safety regulations or to permit violations of such regulations by others
...ensure that units do not conduct joint shipboard ordnance evolutions unless a qualified and certified aviation ordnance safety supervisor is present

8. Weapons Staging and Ready Service

Staging areas designated by COMNAVSEASYSYSCOM will be used for ready service only. Weapons located within staging areas will be loaded on authorized or approved AWSE configured for its own particular weapons configuration. All aviation ordnance within the staging area will be positioned and readily available to afford adequate time for safe aircraft loading. Unprotected stowage in the staging and ready service area should be kept to the absolute minimum. Long-term stowage will be restricted to primary magazines.

9. Weapons Assembly and Disassembly

All aviation weapons unpacking, assembly and disassembly, loading, and unloading will be done in accordance with NAVSEA OP-4, "Ammunition Afloat," NAVSEA OP-3565/NAVAIR 16-1-159/NAVLEX 0967-LP-624-6010 (Electromagnetic Radiation Hazards Manual), and appropriate checklists and technical manuals. **Ordnance will be assembled and disassembled and loaded into launchers and magazines only by personnel who have been properly qualified and certified in the type or family of ordnance with which they are working.** The assembly area will be maintained HERO SAFE whenever HERO SUSCEPTIBLE or HERO UNSAFE ordnance is present. If HERO SUSCEPTIBLE or UNSAFE ordnance must be moved outside normal HERO SAFE assembly areas, the ship's operations officer will ensure that the appropriate HERO or EMCON condition has been set. A visual display indicating the HERO or EMCON condition in effect will be prominently displayed so that assembly personnel can readily ascertain HERO or EMCON condition status.

Figure VI-1. Aviation Ordnance Safety Supervisor Responsibilities

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10. Loading and Downloading

Aircraft loading and downloading will be accomplished in accordance with the approved conventional weapons checklist for the specific aircraft and weapons. The flight deck is the only approved area for loading and downloading aircraft with forward-firing weapons. Loading in the hangar is only authorized in accordance with Appendix D, "Ordnance." All aircraft being loaded with forward-firing ordnance, e.g., rockets, missiles, and guns, will be positioned so that accidental discharge will minimize danger to personnel, the ship, or other aircraft. Mechanical latching during loading operations on aircraft, racks, or launchers will be completed before aircraft engines are started or electrical power is applied. Downloading of aircraft will not commence until the aircraft engines or rotors are secured. Simultaneous fueling and ordnance-loading operations are prohibited unless authorized by the ship's CO. Hot reloading, or reloading weapons with the rotor system or engine turning, is normally prohibited aboard ship.

11. Hangaring Aircraft With Loaded Armament

Hangaring of alert-loaded aircraft may be authorized by the ship's CO when operational necessity dictates the acceptance of the additional risk. Aircraft loaded with rockets and/or missiles will be positioned so that accidental discharge will minimize danger to personnel, the ship, or other aircraft.

12. Arming and De-arming

Ordnance teams assigned to arm or de-arm weapon systems will position themselves so as to accomplish this mission and avoid delaying launching and/or recovery evolutions. Arming and de-arming of weapons will be conducted using the current weapons and stores arming checklists or applicable Service regulations. Arming or

de-arming safety pins will be removed only after the aircraft rotors are engaged and the aircraft is ready for launch, and they will be reinstalled prior to rotor disengagement. Aircraft will not be fueled and armed simultaneously unless authorized by the ship's CO. Arming will be accomplished after fueling operations have been completed. Arming and safety signals used will be in accordance with Appendix F, "Aircraft Handling Signals." All Master Arm weapon system switches will be in the SAFE/OFF or normal position before launch and recovery as required. All weapons will be safed whenever in the ship's control zone.

13. Maintenance on Ordnance-Loaded Aircraft

General maintenance will not be conducted on ordnance-loaded aircraft. Routine servicing and minor maintenance to ready the aircraft for the next launch may be conducted with the following restrictions.

- a. Weapons will be made safe to the maximum degree possible as specified in applicable weapons and stores checklists.
- b. As illustrated in Figure VI-2 a "WARNING — WEAPONS LOADED" placard must be prominently displayed in the cockpit of aircraft loaded with weapons. When displayed, the maintenance or servicing requiring application of electrical power is limited to the following:
 - Refueling.
 - Replacement or checkout of communications, sighting, and navigational equipment.
 - Engine or rotor turn up for checkout.
 - Flight control and hydraulic system checks.

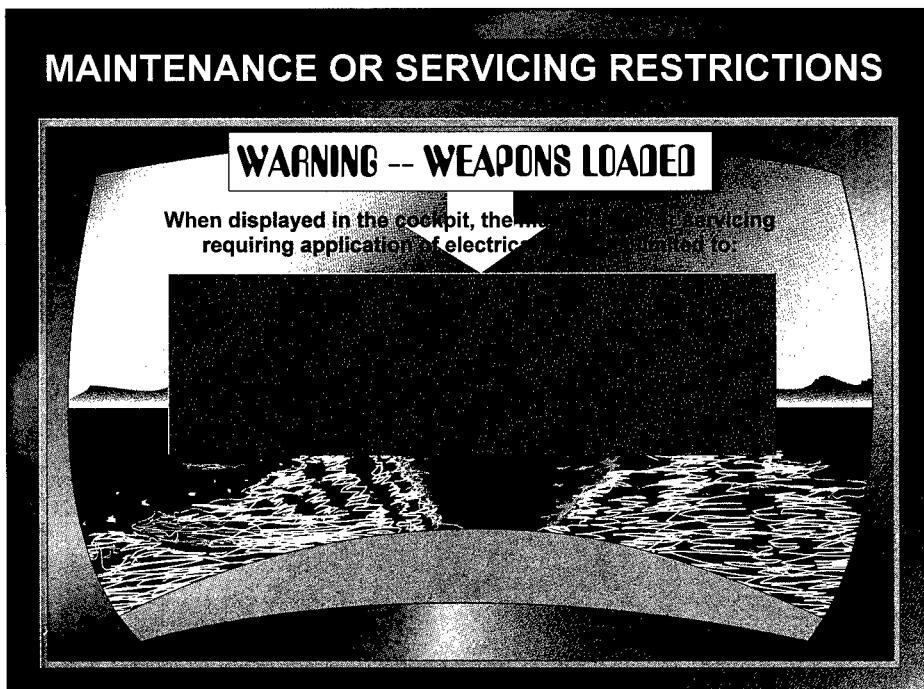


Figure VI-2. Maintenance or Servicing Restrictions

- Replacement or checkout of engine performance or flight instruments.
 - c. Maintenance that requires application of electrical power to armament or weapons release and control circuitry will not be performed while weapons are loaded or being loaded or downloaded. Aircraft that require extensive maintenance (e.g., engine removal, blade removal, or jacking) are not considered readily available for flight and will be downloaded.
- “Ordnance,” for minimum fast cookoff times). In the case of fire or danger of a fire near a weapons staging or ready service area, the staged weapons will be moved to a safe area or jettisoned over the side of the ship as the situation dictates. Explosive ordnance disposal personnel or other ordnance-qualified personnel will take the necessary on-scene action to dispose of the most hazardous ordnance first.

14. Emergency Procedures

Every emergency situation is different and all contingencies cannot be anticipated. However, certain general guidelines are appropriate for shipboard aviation ordnance evolutions.

a. **Shipboard Fires.** Shipboard fires are most hazardous and require immediate action to preclude undue damage to the ship and embarked aircraft (see Appendix D,

b. **Unexpended Weapons.** Weapons and stores not authorized for recovery are delineated in Appendix D, “Ordnance.” Hung or unexpended weapons not authorized for recovery must be jettisoned. When this cannot be accomplished, a divert to a shore installation will be made if feasible. The following guidelines will be used when recovering aircraft must return to the ship with hung weapons:

- **In-flight Procedures.** Pilots will accomplish the following before entering the ship’s landing pattern:

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- Safe all weapons systems;
 - Visually check to ensure ordnance fired was actually expended and to verify the remaining ordnance is still properly loaded on the aircraft;
 - Attempt to jettison hung ordnance; and
 - Notify the ship of any ordnance still loaded on the aircraft and whether it is hung or not.
- **Shipboard Procedures**
 - Air officer or HCO notify the bridge and all other appropriate stations.
 - Set the proper HERO condition.
 - De-arming crews stand by on station.
 - **Ship's Air Officer or HCO**
 - Clear landing spot for recovery.
- Before recovery, announce "Stand by to recover helicopter with hung ordnance on spot. Hung ordnance is (amount and type). All personnel remain well clear of the flight deck area."
 - Ensure that rapid response firefighting equipment is manned and ready.
 - Ensure that the ordnance safety supervisor and the unit de-arming team are on station before recovery.
 - Ensure that all aircraft on the flight deck have secured high frequency (HF) and frequency modulation transmitters, IFF, TACAN, and radar altimeters.
 - Commence downloading of hung ordnance only after the aircraft engines or rotors are secured, aircraft power is off, and the de-arm checklist is completed.
 - Before jettisoning any ordnance from the ship, receive approval from the CO.

CHAPTER VII

HAZARDS OF ELECTROMAGNETIC RADIATION TO ORDNANCE, ELECTROMAGNETIC COMPATIBILITY, AND ELECTROMAGNETIC VULNERABILITY

"In meditation, all dangers should be seen; in execution, none. . ."

**Attributed to Francis Bacon
1561-1626**

1. Introduction

The trend in radar and communications equipment toward greater radiated power has resulted in growing concern with electromagnetic radiation hazards to ordnance and the potential upset, degradation (also called dudding), or damage to avionics and armament systems. These hazards are created when electro-explosive devices installed in modern ordnance are initiated by spurious electromagnetic energy emitted by microelectronic circuits and components installed in modern aircraft and weapon systems.

(series), respectively. Compliance with these standards is established through testing by the Naval Air Test Center, Patuxent River, Maryland, and the Naval Surface Warfare Center, Dahlgren, Virginia. USN and USCG aircraft are tested and discrepancies corrected as part of the shipboard qualification process. When joint operations are contemplated, unit commanders will consult the appropriate tables to determine which HERO or EMV vulnerabilities exist and set HERO and EMCON conditions accordingly. In cases where data does not exist, prudent choices regarding restrictive HERO and EMCON conditions will be required. Because these choices may be operationally debilitating, it is imperative that aircraft types with the potential for shipboard deployment be identified and tested before embarkation. Coordination for testing can be accomplished through COMNAVAIRSYSCOM (PMA251D).

2. Standards and Procedures

The shipboard standards for hazards of electromagnetic radiation to ordnance, electromagnetic compatibility, and electromagnetic vulnerability (EMV) are MIL-STD-1385 (series) and MIL-E-6051

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CHAPTER VIII

SAFETY

"Out of this nettle, danger, we pluck this flower, safety."

William Shakespeare
I King Henry IV

1. Responsibility for Safety

The CO of the ship has supervisory responsibility for the safety of embarked helicopters at all times. The helicopter unit CO or detachment OIC and the individual aircraft pilots are directly responsible for the safety of assigned aircraft and personnel. In questionable circumstances, the unit CO or detachment OIC will make the final determination concerning flight safety of aircraft, crew, and passengers.

shoes, flotation devices, long-sleeved shirts or flight deck jerseys, and long trousers. Reflective tape will be applied to headgear and/or the upper body area of flight deck personnel clothing or equipment. All personnel on exposed decks will remove their hats (except for approved fastened safety helmets) while helicopter operations are being conducted. All personnel on the flight deck must be trained to take cover immediately on command of the flight deck officer, air officer, LSE, or LSO.

2. General Safety Measures

The squadron CO or detachment OIC and ship personnel will evaluate the hazards involved in all phases of shipboard helicopter operations and develop appropriate safety measures. Shipboard personnel will be trained in safe operating procedures before commencement of helicopter operations.

a. During flight operations, only those personnel whose presence is required will be allowed in the flight deck area. All other personnel will remain clear or below deck.

WARNING

Under no circumstances will flash pictures be taken of the helicopter because the flash may temporarily blind the pilots.

c. Personnel working near helicopters must be instructed to observe aircraft carefully for any sign of malfunction (such as smoke or leaking fluids) and report any such condition to the helicopter crew, or if the helicopter is airborne, to the flight deck officer or air officer.

d. Personnel are allowed to transit the area under the rotor arc of an operating helicopter only with the permission of the pilot (who will signal the LSE or LSO before permitting such passage). For operating helicopters configured with a tail rotor, persons transiting from one side to the other will do so via the nose of the aircraft. The use of a guide to move personnel around turning aircraft should be considered.

e. Pilots of helicopters with rotors engaged should maintain eye contact with LSEs or LSOs.

b. As shown in Figure VIII-1, personnel engaged in flight operations will wear approved head and ear protection, sound suppressors, safety goggles, steel toe safety

f. Helicopters shall not be launched or recovered or perform rotor engagement or disengagement with the ship in a turn, unless specifically directed to by the ship's CO.

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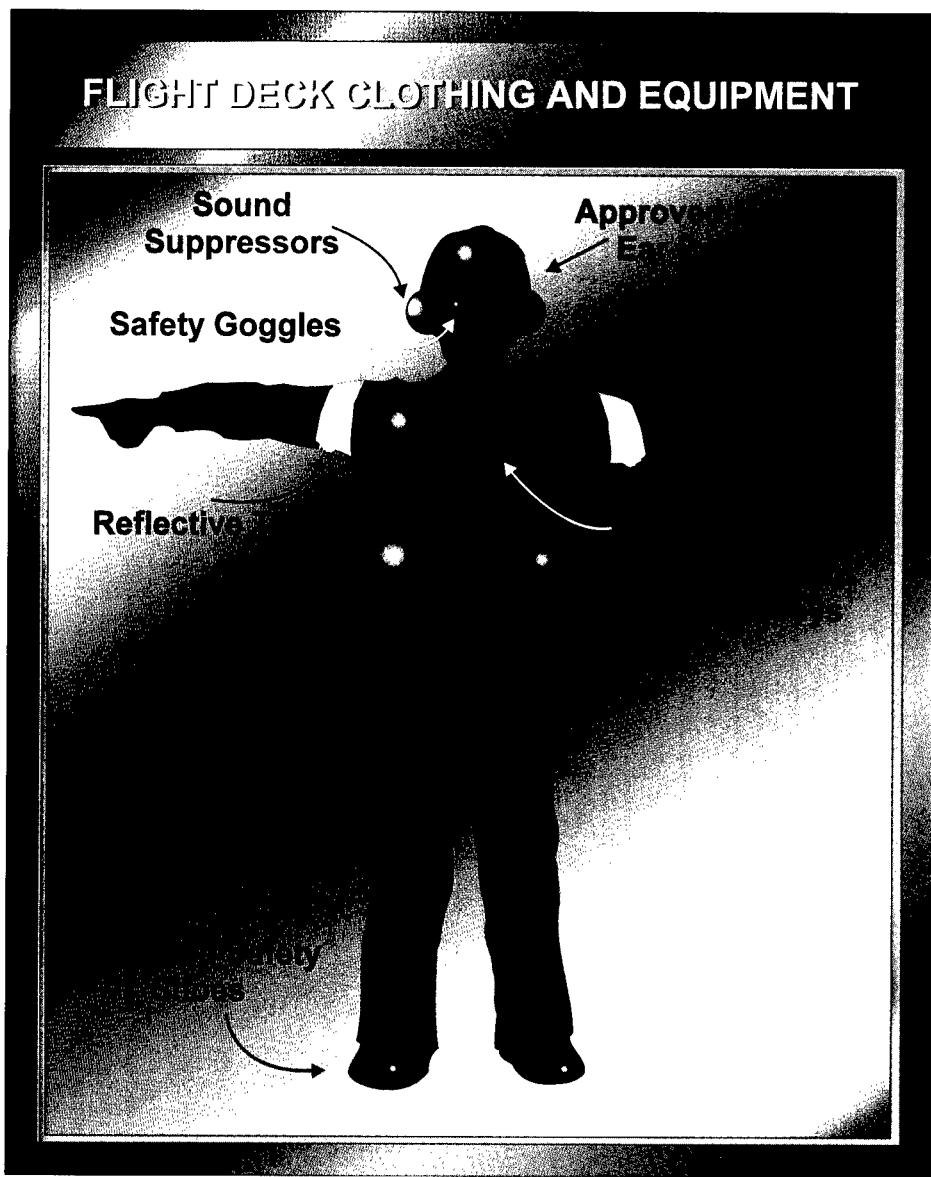


Figure VIII-1. Flight Deck Clothing and Equipment

g. A helicopter will not be flown over another aircraft when landing or taking off.

h. Head and ear protection, along with life vests, will be worn by all personnel working on elevated sections of the aircraft.

3. Passengers

a. Arriving aircraft containing passengers (passengers are personnel on board the aircraft that are not the primary aircrew) will notify the ship upon initial contact that they have

Safety

passengers to unload. Upon landing, the pilot will keep the passengers on board until a guide is in position to escort the passengers from the aircraft across the flight deck. Passengers should keep protective headgear and hearing protection on until clear of the flight deck area. The guide will return headgear and sound protection to the aircraft, if required.

b. **Passengers departing the ship will muster and manifest with the ship's air department.** A guide will escort passengers to the flight deck and the aircraft. Head

4. Foreign Object Damage

All-weather deck areas, and particularly the flight deck, will be inspected before and monitored throughout all helicopter operations to ensure that they are clear of foreign object damage (FOD). FOD-producing material includes rags, paper, line, ball caps, hardware, and other matter that can be caught by air currents and can subsequently cause damage to the aircraft or injure personnel. Ground support equipment, forklifts, tiedown equipment, and chocks will



Personnel working near helicopters must be properly equipped and must adhere to the appropriate safety measures.

protection, flotation devices, and sound protection will be provided to the passengers prior to being escorted onto the flight deck.

WARNING

Passengers are not to wear salt water -activated flotation devices.

c. **Night Overwater Passenger Transfer.** Night overwater passenger flights will be conducted for reasons of operational necessity only. This does not preclude movement of troops or personnel in support of operational exercises.

be properly secured to prevent missile hazards. Trash will not be dumped or burned during helicopter operations. External transfer of mail is prohibited. In addition, smoking is not authorized except in designated spaces, to prevent cigarette butts from reaching the flight deck.

5. Helicopter Equipment Hazards

Equipment aboard helicopters can present dangers to ship personnel. For instance, the ALQ-157 electronic countermeasures equipment on MH-53J helicopters emits

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invisible infrared light energy; personnel should stay at least 12 feet from the transmitters and not look into the filter windows. In addition, the infrared lamp operates at extremely high temperatures which makes the external surfaces of the covert filter and transmitter very hot. These surfaces should be allowed to cool for 30 minutes before personnel are allowed to handle the transmitters.

6. Weapon Hazards

a. **Helicopters parked or operating in the vicinity of ship's weapons are subject to damage from rocket blast, gunfire concussion, and FOD damage from materials scattered when ship's weapons are fired.** All appropriate measures should be taken to preclude the firing of any weapon in the vicinity of the helicopter operating area when an aircraft is parked on deck or when flight operations are in progress. When ship's weapons firing is anticipated, aircraft will be positioned outside the weapons blast or concussion range. If this is not possible, aircraft should be secured as far as is practical from the firing mounts, with doors and hatches open.

b. Procedures for the custody and security of personal small arms (i.e., 9mm and .38 cal. pistols and M16 rifles) will be in accordance with the ship's current small arms (weapons) instruction.

7. Aircraft Movement and Respotting

a. **OOD approval is required before helicopter movement.** The ship will maintain a steady course during aircraft respots except when faced with an emergency. Personnel effecting aircraft movement will be prepared to promptly secure the aircraft should the ship be required to maneuver unexpectedly. Timely requests for permission to move aircraft are necessary so that the OOD

can maneuver the ship to achieve the most stable deck. All requests to respot aircraft on AAA will be coordinated through the aircraft handling officer. Positive communications shall be maintained between the OOD and flight deck officer while moving aircraft.

b. Helicopters with rotors engaged will not be pushed or towed on the flight deck. **Helicopters are not allowed to be repositioned by taxiing on the flight deck.**

c. The following personnel are required for helicopter movement:

- Director (1) (with whistle or other communications capability).
- Brake rider (1) (if aircraft is so equipped).
- Steering bar operator or tow tractor driver (as applicable).
- Main landing gear chock or chain men (2).
- Tail or nose safety observers or chain men (1 or 2).
- Pushers (as required).

WARNING

Only essential personnel should be involved with aircraft movement; all others must remain clear. The move team shall be briefed concerning their duties and responsibilities, maintain a safe distance from the moving helicopter, and have the prescribed equipment.

d. The director will maneuver the aircraft at a slow and controllable rate of speed (no faster than a person can walk). When the ship is unstable, consideration should be given to alternately attaching and removing the chains during helicopter movement. A brake check

Safety

will be performed immediately after initial helicopter movement on all aircraft so equipped.

8. Helicopter Fire Party

The fire party is the ship's primary means of combatting a flight deck fire. The fire party is composed of two initial response aqueous film forming foam (light foam) hose teams and a backup team. The fire party will be composed of ship's company personnel during initial or transient operations; however, during sustained operations it may be augmented with helicopter detachment personnel.

9. Mishap Investigation

a. **Navy and Marine Aircraft.** Naval aircraft mishap investigation procedures are in OPNAVINST 3750.6 (series).

b. **Coast Guard Aircraft.** USCG mishap investigation procedures are in COMDTINST M5100.47 (series).

c. **Army Aircraft.** USA mishap investigation procedures are in AR 385-40.

d. **Air Force Aircraft.** USAF mishap investigation procedures are in AFI 91-204 (safety) and AFI 51-503 (accident).

e. **Judge Advocate General (JAG) Manual or Legal (USCG) Investigation.** In the event of an aircraft mishap, the commanding officer of the host ship will initiate a JAG manual or legal investigation where required. If unusual circumstances require, a senior in the chain of command may assume that responsibility. If a mishap should occur during transient operations, the responsibility for JAG manual or legal investigation remains with the commanding officer of the aviation unit.

f. **Explosive Mishap Reporting.** Explosive mishaps will be reported in accordance with the governing directives of each Service involved. Copies will be provided as necessary to all concerned.

10. Emergency Procedures

Each emergency situation is unique. Therefore, advance formulation of procedures may not hold in every instance, but the following general guidelines are appropriate for shipboard helicopter operations.

a. General Information

- Helicopter emergency information will be passed to the flight deck crew and fire party either over the 1MC or the flight deck crew announcing system, whichever is most expedient.
- When the flight deck has an emergency and a crash alarm is sounded, unnecessary personnel will be cleared from the flight deck and surrounding area.
- **During any emergency, the first consideration of the ship should be to close the distance to the helicopter and prepare for immediate recovery.** If the emergency is single engine or power loss, optimum relative wind for recovery is required. If a flight control malfunction is indicated, a stable flight deck with acceptable winds is warranted. Specific actions are outlined in aircraft flight manuals.

b. **Airborne Aircraft Emergencies.** These fall into three basic categories: (1) cases that cause an aircraft to ditch or crash, (2) cases that require an immediate landing, and (3) cases that require a precautionary shipboard landing.

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- In the event of a crashed or ditched aircraft, the ship will:
 - Plot the position of the crash or ditching;
 - Close on the crash site at best speed;
 - Assemble the rescue boat or rescue helicopter team(s) as appropriate;
 - Station and brief additional lookouts;
 - Recover personnel;
 - Recover aircraft or debris; and
 - Execute SAR plans in accordance with Joint Pub 3-50, "National Search and Rescue Manual Vol I: National Search and Rescue System," and other applicable directives.
- Certain aircraft emergencies may necessitate an immediate landing. If an immediate shipboard landing is required, the ship will execute the following procedures:
 - Maintain radar or radio contact if possible. If all contact is lost, commence crash or ditch procedures.
 - Head for the helicopter at best speed.
 - Obtain amplifying information from the pilot regarding the nature of the emergency and intentions.
 - Set emergency flight quarters. Emergency flight quarters entail, at a minimum, expeditiously stationing both fire parties, stationing the pilot rescue detail, and setting material condition ZEBRA in the effected part of the ship.
 - Request required assistance from accompanying units.
- Turn to BRC and adjust speed to provide a steady deck 2 minutes before helicopter arrival (3 minutes for night or IMC).
- Clear all unnecessary personnel from the flight deck area before establishing a green deck. The crash or fire party will move as far away as possible from the landing site but remain at a quick access location, ready to use crash, fire, or rescue equipment as directed.
- Chock and tie down the aircraft (as for a normal recovery) once it is resting safely on the deck and ordnance or weapons have been de-armed.
- Situations in which continued flight presents a moderate hazard to the aircraft or crew, but the aircraft's condition is stable, require a precautionary landing. Such a situation is an emergency when declared; however, proper preparation for recovery is more important than immediate termination of the flight. The ship will be alert to the possibility that the situation may deteriorate such that an immediate landing is required. The ship will execute the following procedures:
 - Maintain radar or radio contact.
 - Set flight quarters as soon as practical without interfering with urgent ship evolutions. The fire parties will be fully formed and additional alert conditions will be set as dictated by the circumstances.
 - Turn to BRC and adjust speed to recover aircraft at the earliest opportunity.
- **Engine Failure or Power Loss.** Generally speaking, multi-engine helicopters can fly safely when one engine has failed, but their ability to hover is very limited. Helicopters experiencing engine power loss must be afforded the maximum amount of available deck space for a run-on or no-hover landing.

Safety

along with optimum relative wind. A waveoff may be impossible; therefore, approach and landing should be planned and executed with the utmost care.

c. Flight Deck Emergencies

- **Helicopter Engine Fires on Deck.** The LSE or LSO will be alert at all times for fire and will give the appropriate hand signals to the pilot if fire indications are observed. If the fire is internal to the engine, generally the operator will attempt to extinguish the fire by motoring the engine. If the fire is external to the engine, the engine will be secured and firefighting efforts initiated. Initially, installed aircraft systems or carbon dioxide should be used. Large or persistent fires will require the use of dry-chemical and/or foam agents.
- **Other Aircraft Fires.** Shipboard fires are most hazardous and immediate action is required to prevent even the smallest of fires from growing and doing extensive damage. In the event of an aircraft fire, the first priorities are rescue of personnel and the prevention of ordnance detonation. All possible steps will be taken to minimize damage to aircraft and the ship consistent with these priorities and to ensure prompt control of the fire.
- **Landing Gear Emergencies.** If a helicopter returns with inoperative landing gear, maintenance personnel should inspect the aircraft in a low hover (see Appendix F, "Aircraft Handling Signals," for appropriate emergency hand signals) and attempt to lower the landing gear manually after the aircraft is properly grounded. If this fails, the aircraft may be landed with suitable portions of the structure resting on a stack of pallets, preferably banded together, secured to the deck and padded with mattresses. The ship should

be maneuvered for an optimum combination of relative wind and deck stability.

- **Hung Droop Stops.** If one of the mechanical droop stops fails to seat during disengagement, the LSE or LSO will signal the pilot to reengage the rotor system. Disengagement should be reattempted using a different control position and relative wind combination. If this fails, the flight deck area around the aircraft will be evacuated of all nonessential personnel. The pilot will communicate the requirements dictated by aircraft-type operational manuals to the tower and the LSE or LSO as appropriate, and make a shutdown in accordance with aircraft-type operational manuals.
- **Aircraft Jettison.** If a situation arises that requires a damaged or burning helicopter be jettisoned overboard, the decision to jettison and selection of procedures to use will be made by the ship's CO or OOD.

11. Aircraft Emergencies

The nature of some emergencies requires priority and/or diversionary measures. The ultimate resolution of these emergencies involves a command decision, based on the type of emergency and weather conditions in the recovery area. All pertinent details must be collected that might aid in the evaluation of an emergency, and the command and other interested agencies must be kept properly informed. SAR action should be executed when reasonable doubt exists as to the safety of the aircraft. From a control standpoint, aircraft emergencies fall into four categories.

- a. **Communication Failures.** Lost communications emergency squawks are shown in Figures VIII-2 through VIII-4 and are as follows:

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- **Mode III.** An aircraft with radio difficulties (transmitter and/or receiver) should squawk Mode III Code 7600 or emergency Code 7700 as appropriate. (Code 7700 first, followed by Code 7600, will assist in alerting approach control.)
 - **Mode I.** The following codes will amplify difficulties in conjunction with a Code 7600 or 7700. No receiver will mean that the primary UHF, auxiliary receiver, and UHF and/or VHF Guard receiver are inoperative. If any receiver is operative, the controller is capable of controlling the aircraft using IFF standby squawks and/or aircraft turns to acknowledge receipt of instructions.
 - USCG medium-endurance cutter 210 and icebreaker 400 class USCG cutters are unable to interrogate IFF transponders.
 - If aircraft is in radar contact and lost communications, use fire control radar
- to “lock up” aircraft equipped with AN/APR-39, 1 minute on and 1 minute off cycle.
- a. Navigational aid failures.
 - b. Crewmember injuries.
 - c. Other aircraft systems failure.

12. Basic Emergency Procedures

Emergencies where navigation aids and/or communications are available should be handled according to procedures prescribed in this publication. Emergency procedures for aircraft system failures are covered in the appropriate aircraft flight operations manual.

13. Lost Aircraft Procedures

When the position of an aircraft is in doubt, the controller must immediately commence the following procedure:

HYDRAULIC ELECTRICAL FUEL OXYGEN ENGINE (HEFOE) SQUAWK TABLE		
Mode I		Mode III
First Digit	Second Digit	
0 - OK		
1 - Hydraulic	1 - No Receiver, TACAN OK	
2 - Electrical	2 - No Receiver, ADF OK	7700/7600
3 - Fuel	3 - Receiver OK, no NAVAID(s)	(with HEFOE code, use Code 7700)
4 - Oxygen		
5 - Engine		

Figure VIII-2. Hydraulic Electrical Fuel Oxygen Engine (HEFOE) Squawk Table

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ASSISTANCE REQUIRED SQUAWKS TABLE	
All 7 Mode I squawks indicate no receiver and no NAVAID(s)	
Mode I	Mode III
70 - Desire tanker to join	Fuel onboard (up to 7,500 lb)
71 - Intend bingo	
72 - Desire aircraft to assist	

Figure VIII-3. Assistance Required Squawks Table

LIMITED COMMUNICATIONS SQUAWKS TABLE	
Requires a 1-minute cycling of Mode III from 7600 or 7700 to desired channel	
Mode I	Mode III
60 - Auxiliary Receiver channel _____	Channel usable (0100-2000, and 2100 = Guard)
61 - No NAVAID(s). Receiver on channel _____	
62 - TACAN ok, Receiver on channel _____	

Figure VIII-4. Limited Communications Squawks Table

a. If there is no contact:

- Obtain radar and radio contact as soon as possible. Take control of the circuit in use and use relay aircraft. Continue to send information in the blind and search all IFF modes. Commence communications search and monitor guard channel (243.0 MHz) for emergency aircraft calls.
- Inform the OTC.
- Keep an up-to-date estimate of the aircraft's fuel state.

• Call for TACAN and UHF or DF and electronic warfare support measures watch to be set immediately.

• Alert the command for the possible use of other aids to lost aircraft, such as black smoke, vertical searchlights, antiaircraft bursts, starshells, fire control tracking balloons, energized prebriefed sonobuoy channel, and other navigation aids.

b. Once contact is regained:

- Vector the aircraft to nearest airfield or back to the force.

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- Ensure that the position of aircraft is recorded.
- Check fuel state.
- Vector nearest aircraft to act as escort if necessary.
- Have the aircraft gain altitude, fuel state permitting, if communications are still unsatisfactory.

14. Lost Communications During Instrument Flight Rules

If under IFR conditions, the pilot will follow procedures set forth in the prebriefed assigned marshal or TACAN approach and plan the flight in order to commence the approach at the prebriefed recovery time.

15. Lost Communications While on Filed Flight Plan

The pilot will proceed in accordance with prescribed air traffic control procedures.

16. Communications or Navigation Aids Failure During Approach

In the event of communications failure, if navigation aids are available, the pilot will continue the approach to the missed approach point (MAP). If VMC exist at the MAP, the aircraft commander will decide whether to land the aircraft. If VMC do not exist at the MAP, or if in the aircraft commander's judgment a safe landing cannot be completed, the aircraft will execute the missed approach and proceed via parent Service directives or as briefed.

- a. If navigation aids failure is experienced, the ship will vector the helicopter for a radar-controlled approach.

- b. If an approach is mandatory, the pilot may execute one of the following procedures, as applicable:

- **Navigation aids failure.** The ship will vector the aircraft for a radar-controlled approach, except the pilot will continue descent until visual contact is achieved with the ship or wake.
- **Communications failure.** The pilot will execute the appropriate approach as outlined above.

c. All ships at sea will monitor UHF Guard frequency because a pilot may attempt to communicate using personal survival radio. Transmission may be made to an aircraft through voice channels available on some NAVAIDS (instrument landing system, NDB, VHF omnidirectional range station, or UHF).

17. Emergency Landings

a. **As much deck as possible will be made available for emergency helicopter landings.** The senior helicopter squadron or unit officer on board should take station in the PriFly, air operations control center, HDC, or CIC as appropriate. The optimum relative wind should be determined, and the ship maneuvered as necessary. Once the aircraft is on final approach, it is imperative that the ship hold a steady course.

b. Certain types of emergencies may permit use of an LSE or LSO, in which case the position should be such as to minimize exposure to danger. The LSE or LSO will give a waveoff only in case of fouled deck or if directed to do so by the tower or bridge.

18. Emergency Signals

The aircraft will squawk IFF emergency as appropriate. The CIC will be alert for IFF emergency squawk and immediately alert the

Safety

bridge. Priority will be given to effected aircraft and all emergency procedures used.

19. Aircraft Carrier Procedures

The following safety procedures apply specifically to operations from aircraft carriers:

a. **Night and IMC helicopter recoveries should be conducted to the angled deck from astern, using the OLS with the wind oriented to the centerline of the angled deck and within the wind envelope of the particular aircraft model.** During night VMC recoveries

on CVs equipped with operating sodium vapor floodlights, and when the after portion of the flight deck is not clear, helicopters may make an approach using the OLS and centerline of the angle deck. After reaching the fantail, and when the deck and LSE or LSO have been visually acquired, the helicopter can then slide left, fly up the port side, and slide right to the landing spot on the flight deck under LSE direction.

b. Helicopters will not cross within 5 miles of the ship's bow or stern without specific clearance from the tower or controlling unit because of the hazards associated with fixed-wing launch and recovery operations.

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CHAPTER IX LOGISTICS

"The onus of supply rests equally on the giver and the taker."

George S. Patton, Jr.
War As I Knew It, 1947

1. Background

See Figure IX-1.

The purpose of this chapter is to outline general procedures for providing material support for helicopter units assigned to joint operations. The scope and details of the implementation of these procedures are highly dependent on the duration and circumstances of a particular exercise or

mission. A short-duration detachment will usually draw the bulk of its supply material from a parent-Service-provided packup kit. Resupply of drawn material will occur on an as-needed basis. Material support for detachments of longer duration will be better served by establishing an independent unit identity, especially when shipboard operations will be conducted outside the umbrella of the parent-Service support infrastructure. Establishment of independent unit identity

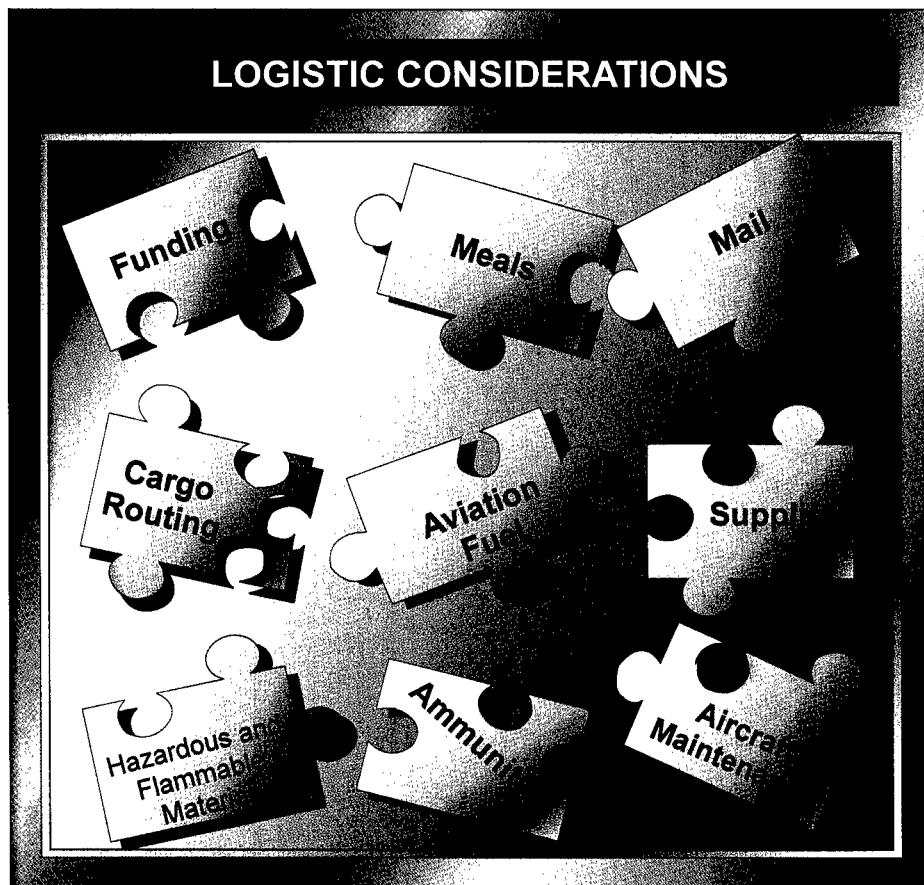


Figure IX-1. Logistic Considerations

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will provide the most flexible support if a helicopter detachment is to relocate from ship-to-ship or ship-to-shore. It is recommended that the detachment bring as many consumable items as possible.

2. Funding

The parent organization of a helicopter detachment is responsible for funding the expenses associated with aircraft maintenance and operation. Ships' commanding officers are responsible for funding shipboard operating and maintenance costs from the operating target allowance. Unless specified, funding will be provided by the parent organization or groups performing travel under joint travel regulations. Units required to purchase supplies or fuel from ships' stores will be required to provide appropriate accounting data.

3. Meals

Shipboard meals for officers are normally handled by an independent fund to which

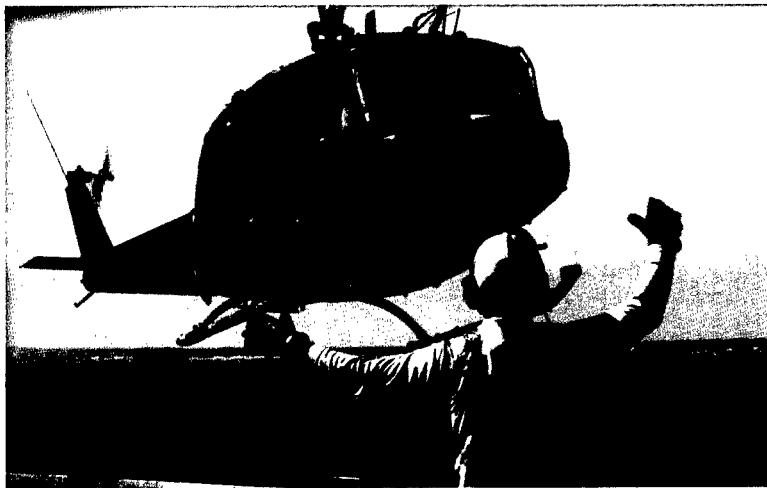
facility operated by the ship's supply officer and funded from the ration allowances of the members. Orders for enlisted members should reflect rations in kind for the duration of shipboard embarkation. Coast Guard cutters will treat meals provided to detachment personnel as reimbursable issues and submit forms DD-1149 in accordance with COMDTINST M4061.3 (series).

4. Supply

The ship's supply officer can provide assistance in preparing and transmitting properly formatted supply requisitions into the system; however, the helicopter detachment unit is responsible for providing the technical, identification, and funding data for the required material.

5. Cargo Routing

Procedures to ship material to units deployed worldwide exist within the Defense Transportation System and are contained in DOD 4500.9-R, "Defense Transportation



The parent organizations of each helicopter detachment is responsible for aircraft maintenance and operation.

individual officers contribute. Officers can expect to pay directly or be billed for meals consumed. Enlisted members eat in a dining

Regulation," and DOD 4500.32-R, "Military Standard Transportation and Movement Procedures." The shipper's service control

Logistics

office (SSCO) for all US Navy units is the naval military transportation office (NAVMTO) in Norfolk, Virginia. NAVMTO maintains a cargo routing information file (CRIF) that contains up-to-date information on how to route material to covered mobile units. Detachments possessing individual unit identification codes and desiring to avail themselves of this service should make arrangements with NAVMTO and their parent SSCO to be included in the CRIF. Ships will keep NAVMTO and other cognizant SSCOs apprised of consignment instructions for embarked detachments. Alternatively, material for an embarked detachment may be consigned to the host ship. Detachments operating from Coast Guard cutters should contact the cutter's supply officer before deployment to coordinate cargo routing.

6. Aviation Fuel

If reimbursement is required, helicopter detachments will reimburse ships for aviation fuel at the established DOD price. Selected ships may be capable of processing a DOD fuel identification plate; however, use of a DD-1348 form is more common. For continuing operations, fuel may be billed on the 10th, 20th, and last day of the month to coincide with ship's fuel usage reports. Because many ships are not equipped with meters, aircrew should be prepared to determine the quantity delivered, in pounds, using aircraft fuel gauges.

7. Hazardous and Flammable Material

Stowage and disposal will be in accordance with current directives provided by the host activity.

8. Ammunition

a. Issuing Activities. Issuing activities will ensure that only authorized and fully serviceable ammunition is used. This will be

accomplished by checking the mark and modification of weapons and/or weapon systems, their ammunition and ammunition component requirements, containers, powder indexes, ammunition lot numbers, charge weights, grade classifications, and the external conditions of the items. Ammunition items issued will be complete as identified by a DOD identification code (DODIC) or naval ammunition logistics code (NALC), ammunition assembly sheet, complete round chart, or other approved publication. Ammunition or components without DODICs or NALCs will not be issued to combatant ships.

b. Shipment of Explosives. Ammunition or other hazardous materials to be shipped to ships by a DOD component or a common (commercial) carrier will be packed, marked, and labeled in accordance with NAVSEA OP2165, Volume 1, "Navy Transportation Safety Handbook," or appropriate DOD or US Transportation Command hazardous material regulations for rail, motor vehicle, water, or air shipment.

c. Allowance Lists. Ammunition requirements for units afloat are established to provide a basic authorization by quantity and type to suit the applicable mission and armament of the unit. Normally, these authorizations are in the form of allowance lists.

d. Mission Load Allowances. The mission load allowance is the allowance of ammunition carried by certain amphibious warfare and auxiliary ships in support of their assigned mission, exclusive of the ship's own armament.

e. Replenishment. Weapons expended from allowance will be replenished using existing supply procedures. In many instances, Service units will use ammunition from Navy or Marine Corps stock. When this occurs, the Navy or Marine Corps is entitled

Chapter IX

to replacement or reimbursement from the parent Service.

9. Mail

The military postal service is a method for delivery of moderate-sized parts and supplies as well as personal and official mail. Helicopter detachments may obtain a mobile unit Army Post Office or Fleet Post Office address from the US Military Postal Service Agency, Washington, D.C., IAW the DOD Postal Manual (DOD Instruction 4525.6). Establishment of an address and ZIP code is required approximately 60 days in advance. Ships will update mail routing instructions for embarked detachments.

10. Aircraft Maintenance

Available aviation maintenance facilities vary widely with ship class. The Air-Capable Ships Facilities Resume provides guidance regarding air-capable ships. AS and AAAS have extensive maintenance facilities, including an aircraft intermediate maintenance department, which is capable of a wide range of functions. These functions include, but are not limited to, electronics repair, tire and wheel buildup, composite material repair, oxygen servicing, and inspection and repair of aircrew survival equipment. However, support for particular systems is not assured and should be determined in advance. Joint force commanders are responsible for coordinating required maintenance infrastructure.

APPENDIX A

SAMPLE FORMATS

- Annex A A Sample Letter of Instruction (LOI)
- B Sample Currency Waiver Request Format
- C Sample Waiver Request Format (For Other Than Currency Requirements)
- D Sample Urgent Change Recommendation Format

Appendix A

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ANNEX A TO APPENDIX A SAMPLE LETTER OF INSTRUCTION (LOI)

From: Commander, Naval Surface Force, US _____ Fleet
To: Commander, USS _____
Commander, _____
Subj: LETTER OF INSTRUCTION (LOI) FOR DECK LANDING QUALIFICATION (DLQ) OPERATIONS
Ref: (a) Memorandum of Understanding btwn CNO and COMJSOC of 3AUG87
(b) Shipboard aviation facilities resume (NAEC-ENG-7576)
(c) NWP 3-04.1M
(d) JP 3-04.1

1. Summary. In accordance with ref (a) subject LOI is provided for training operations. LOI describes concept of operations and assigns responsibility to commanding officer (CO), USS and Officer in-Charge (OIC) _____ for DLQ operations. The LOI is effective for planning approaches/landings/takeoffs during day/night/NVD DLQ operations.

2. Mission. USS _____ shall provide underway DLQ ship services for joint service training. Individual ship routines and exercises may be conducted consistent with safety and attainment of DLQ training.

3. Concept of Operations. Helicopters will conduct DLQ training consisting of visual flight rules day/night NVD landings on USS _____. Once deck landing aircrew proficiency is established, phase II, III and IV operations are authorized. Instrument flight rules operations are not authorized.

4. Command Relationships/Responsibilities

a. COMNAVSURF _____ is assigned as officer scheduling exercise (OSE).

b. Commanding Officer, USS _____, is assigned as Officer in Tactical Command (OTC) for scheduled DLQ exercises and will coordinate with area and shore commands as appropriate for OPAREA clearance. The flight deck safety and indoctrination brief is provided to aircrews prior to the scheduled operations.

c. Officer in Charge (OIC) _____ is assigned as Officer Conducting Exercise (OCE). OCE shall ensure aircrews comply with all shipboard helicopter DLQ currency requirements. Prior to commencing DLQ operations, OCE is directed to ensure the following items, as a minimum, are briefed between ship and aircrew:

- DLQ dates/times
- type/number helicopters
- type/number qualifications required
- radio frequencies/call signs/navaids
- SAR procedures (ref (d) refers)

Annex A to Appendix A

- helicopter wind envelopes (refs (d)/(f) refer)
- ship/helicopter lighting for night NVD operations (ref e refers)
- adverse weather procedures
- aviation fuel requirements/reimbursement
- ship NVD requirements
- messing/billeting requirements
- aircraft mishap reporting responsibilities/requirements

5. Helicopter Operations

a. Shipboard Prerequisites:

- (1) training prerequisites and qualifications requirements are contained in ref (a).
- (2) aircrews shall brief night deck/fire party personnel on helicopter safety requirements/procedures to include an aircraft walk-around orientation which should be conducted following initial landing of each type helicopter used and shall be completed prior to commencing DLQ operations.
- (3) OSE shall designate and provide a Naval Aviation Safety Observer (NASO) who shall assist Helicopter Control Officer (HCO) and serve as primary advisor to OTC concerning matters involving safe conduct of flight operations. USS air officer shall serve as NASO.
- (4) OCE shall provide a designated joint service aviator to serve as liaison officer (LNO) between ship and helicopter detachment and to assist HCO and NASO during DLQ operations.
- (5) OCE/LNO shall provide helicopter egress diagrams, fuel cell location and tie down points to HCO and crash/fire crew.
- (6) aircrews shall be thoroughly familiar with refs (b) and (c).

b. The following pertain to flight operations:

- (1) OTC approval required for NVD operations.
- (2) LSE shall be utilized for all scheduled operations and shall be positioned to minimize exposure to hazards while maintaining positive control of aircraft.
- (3) all night flight operations shall be conducted with NVDs. NVDs shall be used by all flight deck control personnel.
- (4) multiple MH-6 takeoff/landings to include 6 aircraft are authorized with OTC concurrence. Ensure a minimum of 15 feet clearance between rotor discs.
- (5) NVD operations without flight deck lighting are authorized for Phase II, III, and IV operations as briefed at pre-sail conference, with approval of OTC. At all other

Sample Letter of Instruction (LOI)

times, ref(c) is germaine. Lighting shall be energized to no less than minimum intensity and shall be adjusted to provide adequate illumination for safe visually unaided operations during crew change and/or refueling evolutions.

(6) fast-rope operations shall not be conducted to any area of the ship not certified by ref (b) for class 4 or class 5 hover operations.

(7) helicopters shall be chocked/chained for all crew change, passenger transfer, refueling, and start/shutdown evolutions.

(8) two-way radio communications shall be maintained between helicopters and ship.

c. Aircraft should arrive overhead with JP-5. Use of JP-4/JP-8 is authorized but not desired. Helicopters shall shutdown prior to gravity refueling, if applicable.

7. Administration/Logistics. OCE is responsible for coordinating shipboard billeting/messing/administrative/logistic requirements, if any. OTC should be prepared to provide support when feasible.

8. Safety

a. Safety of personnel is paramount at all times. Training operations shall be planned with consideration for weather, crew rest, experience levels, etc. OTC may terminate operations if, in his/her opinion, conditions so warrant.

b. In event of helicopter mishap, OTC OPREP-3 should include joint service commands deemed appropriate by OCE. Additional required mishap/incident reports/actions will be per joint service regulations.

9. Operational Security. The sensitivity of joint service mission requires strict operational security throughout the chain of command. Personnel not required for the safe completion of flight operations shall remain below decks or within the skin of the ship.

ASST CHIEF OF STAFF
AVIATION

Copy to:
GROUP
SQUADRON
Participating Army or Air Force units

Annex A to Appendix A

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ANNEX B TO APPENDIX A SAMPLE CURRENCY WAIVER REQUEST FORMAT*

FROM (Air Force/Army originator)

TO For Air Force originator:
HQ USAF WASHINGTON DC//XOOS// (Thru appropriate channels)
For Army originator:
CSA WASHINGTON DC//DAMO-TRS// (Thru appropriate channels)

INFO CNO WASHINGTON DC//889F//
(Joint Force Commander)
(Joint Force Navy Component Commander)
(other appropriate agencies)

(Classification) //N03000//

MSGID/GENADMIN/(ORIGINATING COMMAND)/(OFFICE SYMBOL)//

SUBJ/DECK LANDING QUALIFICATION CURRENCY WAIVER REQUEST//

REF/A/PUB/Joint PUB 3-04.1//

AMPN/JTTP FOR SHIPBOARD HELICOPTER OPERATIONS//

REF/B/MOU/ARMY AIR FORCE DECK LANDING OPERATIONS, JULY 88//

AMPN/MOU WITH NAVY FOR SHIPBOARD HELICOPTER OPERATIONS//

RMKS/

1. IAW REF A, REQUIRE DLQ CURRENCY WAIVER FOR
(specify—day/night/NVG) QUALIFICATIONS

2. QUALIFICATION EXPIRED ON (date) DUE TO
(reasons)

3. NO OTHER OPTIONS TO REQUALIFY EXIST WITHIN CURRENT TIME
CONSTRAINTS. (i.e., using USN, USMC, or other Service unit IPs)

4. FOL INFO PROV:

- A. (name/rank)
- B. TOT HRS (insert #)
- C. TOT NVD HRS (insert #) (if applicable)
- D. TOT SHIP LDNGS (insert #)
- E. TOT NVD SHIP LDNGS (insert #)

* Note. Waiver requests are handled on a case-by-case basis between USN (OP-N889F) and the USA (DAMO-TRS) or USAF (XOOS) based on MOU between the Departments of the Navy, Air Force, and Army titled "Army/Air Force Deck Landing Operations," July 1988.

Annex B to Appendix A

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ANNEX C TO APPENDIX A
SAMPLE WAIVER REQUEST FORMAT*
(For Other Than Currency Requirements)

FROM (Air Force/Army originator)

TO For Air Force originator:
HQ USAF WASHINGTON DC//XOOS// (Thru appropriate channels)
For Army originator:
CSA WASHINGTON DC//DAMO-TRS// (Thru appropriate channels)

INFO CNO WASHINGTON DC//N889F//
(Joint Force Commander)
(Joint Force Navy Component Commander)
(other appropriate agencies)

(Classification) //N03000//
MSGID/GENADMIN/(ORIGINATING COMMAND)/(OFFICE SYMBOL)//
SUBJ/ (specify) WAIVER REQUEST//
REF/A/PUB/Joint PUB 3-04.1//
AMPN/JTTP FOR SHIPBOARD HELICOPTER OPERATIONS//
REF/B/MOU/ARMY AIR FORCE DECK LANDING OPERATIONS, JULY 88//
AMPN/MOU WITH NAVY FOR SHIPBOARD HELICOPTER OPERATIONS//
RMKS/
1. () (specify waiver requested)
2. () (specify reason for waiver request)
3. () (provide data to support request)

* Note. Waiver requests are handled on a case-by-case basis between USN (CNO N889F) and the USA (DAMO-TRS) or USAF (XOOS) based on MOU between the Departments of the Navy, Air Force, and Army titled "Army/Air Force Deck Landing Operations," July 1988.

Annex C to Appendix A

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ANNEX D TO APPENDIX A

SAMPLE URGENT CHANGE RECOMMENDATION FORMAT

FROM (originator)

TO CNO WASHINGTON DC//N889F//
JOINT STAFF WASHINGTON DC//J7-JDD//

INFO AIG 7029
COMNAVAIRPAC
CINCPACFLT PEARL HARBOR or CINCLANTFLT NORFOLK VA
NAVSAFECEN NORFOLK VA
NAVTACSUPPACT WHITE OAK MD
(other appropriate agencies)

(Classification) //N03000//
MSGID/GENADMIN/(ORIGINATING COMMAND)/(OFFICE SYMBOL)//
SUBJ/URGENT CHANGE RECOMMENDATION FOR JOINT PUB 3-04.1
REF/A/PUB/JOINT PUB 3-04.1//
AMPN/JTTP FOR SHIPBOARD HELICOPTER OPERATIONS//
RMKS/

1. IAW REF A URGENT (SAFETY) CHANGE IS RECOMMENDED FOR JOINT PUB 3-04.1
2. PAGE _____, PARAGRAPH _____, LINE NO. _____,
FIGURE NO. _____
3. PROPOSED NEW TEXT
4. JUSTIFICATION

Annex D to Appendix A

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APPENDIX B

CONTROL AREAS AND APPROACH CHARTS

- Annex A Standard Patterns and Zones
- B Approach Charts for Air-Capable Ships
- C Emergency Patterns and Procedures
- D Typical Landing Procedures

WARNING

This appendix contains information that may change without notice through the joint publication system. If a conflict exists with specific procedures, those specific procedures will have precedence.

Appendix B

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**ANNEX A TO APPENDIX B
STANDARD PATTERNS AND ZONES**

Annex A to Appendix B

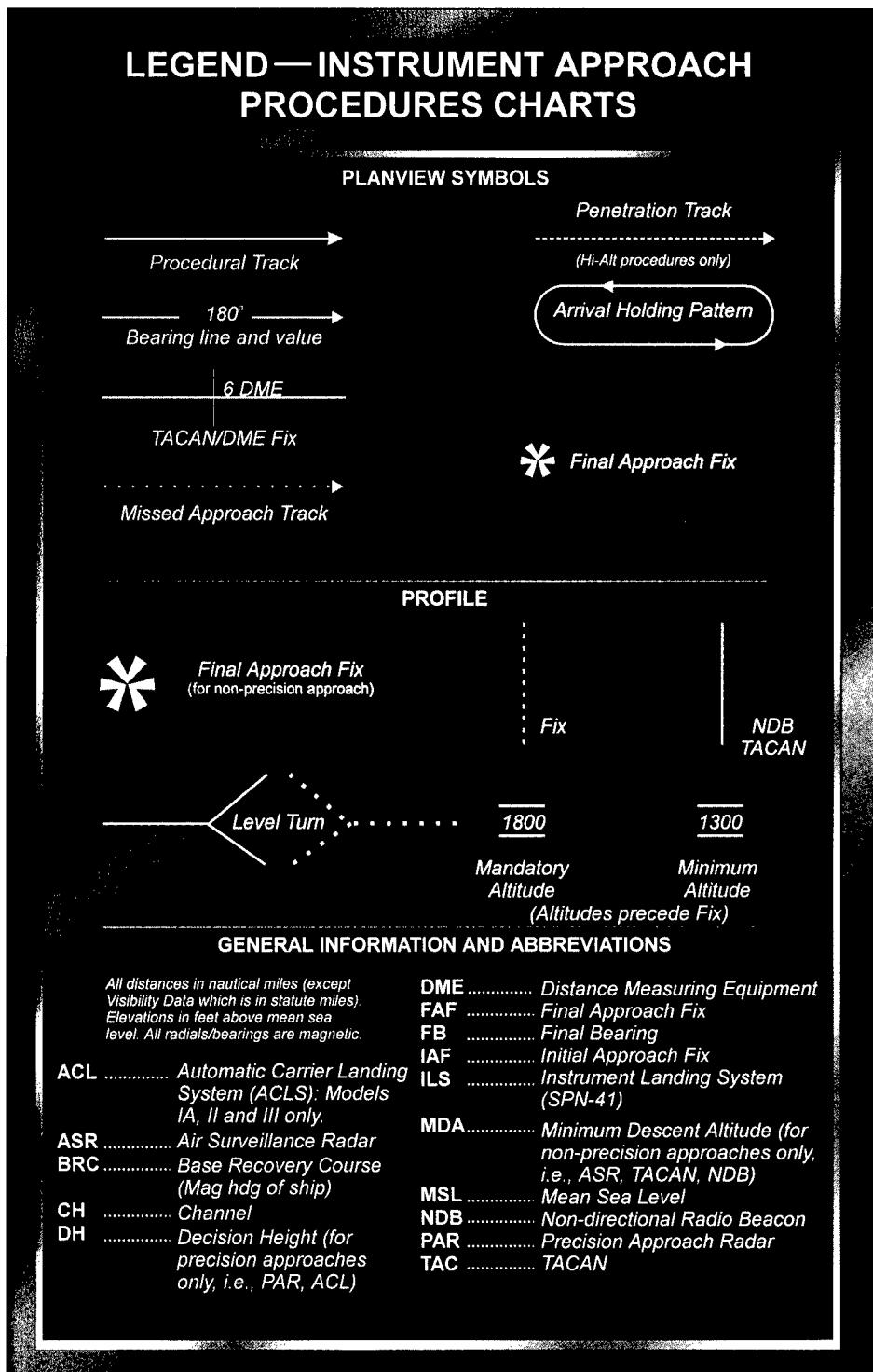


Figure B-A-1. Legend — Instrument Approach Procedures Charts

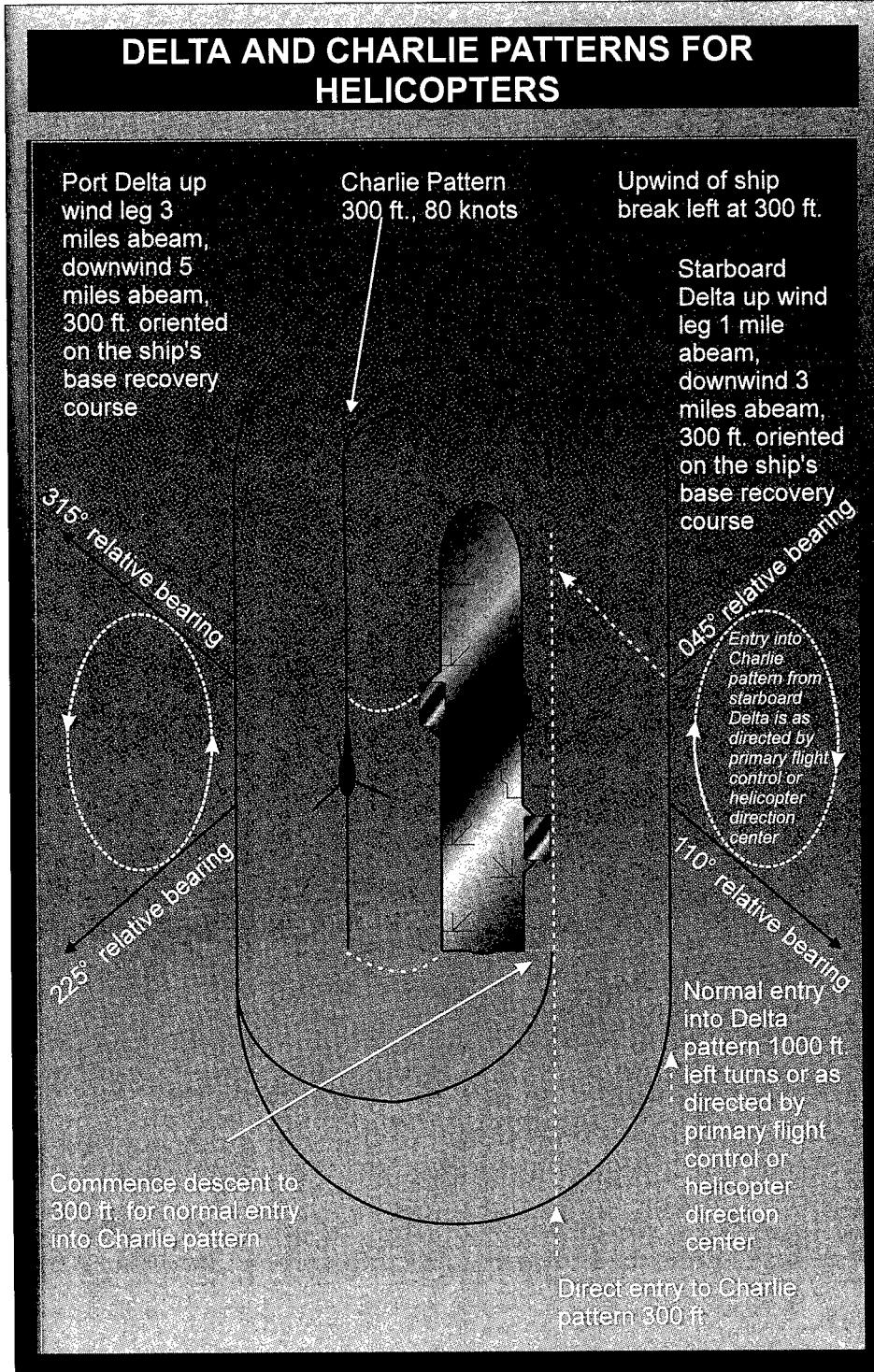


Figure B-A-2. Delta and Charlie Patterns for Helicopters

Annex A to Appendix B

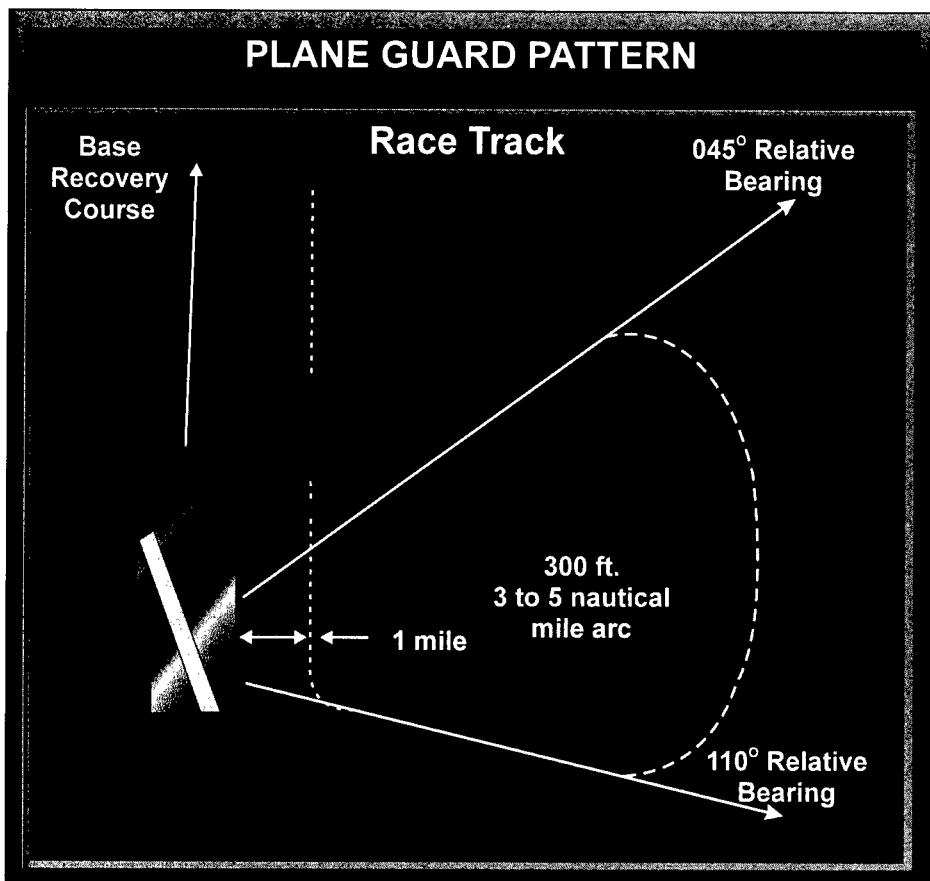


Figure B-A-3. Plane Guard Pattern

Standard Patterns and Zones

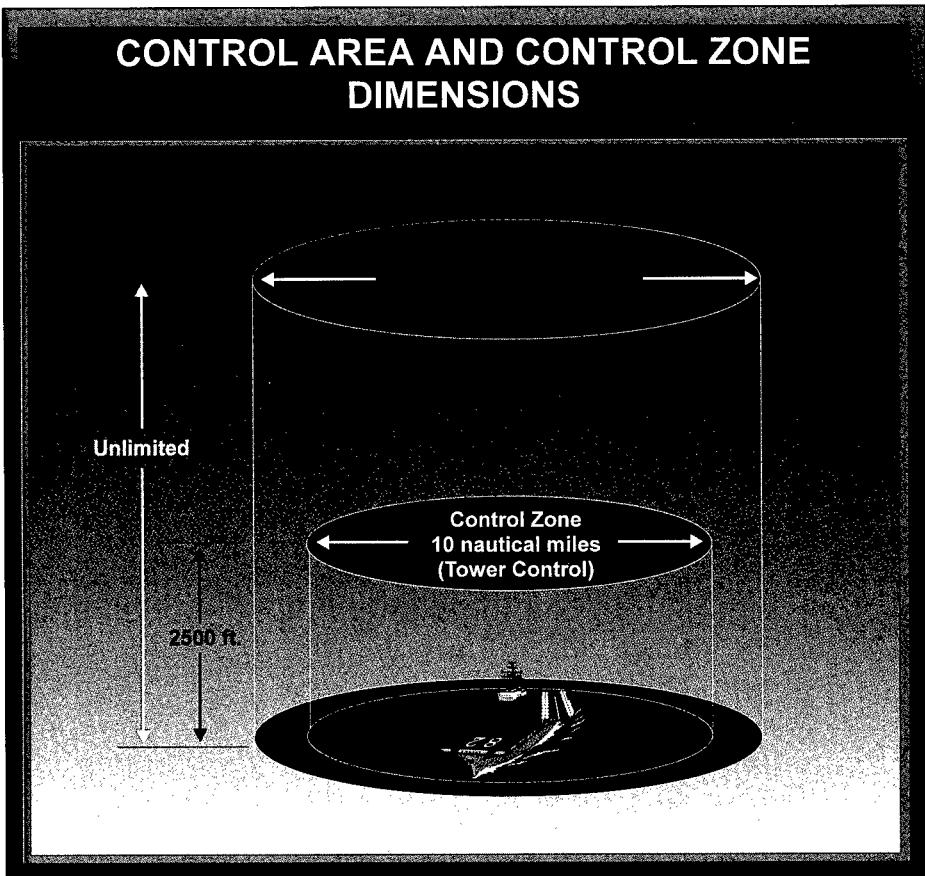


Figure B-A-4. Control Area and Control Zone Dimensions

Annex A to Appendix B

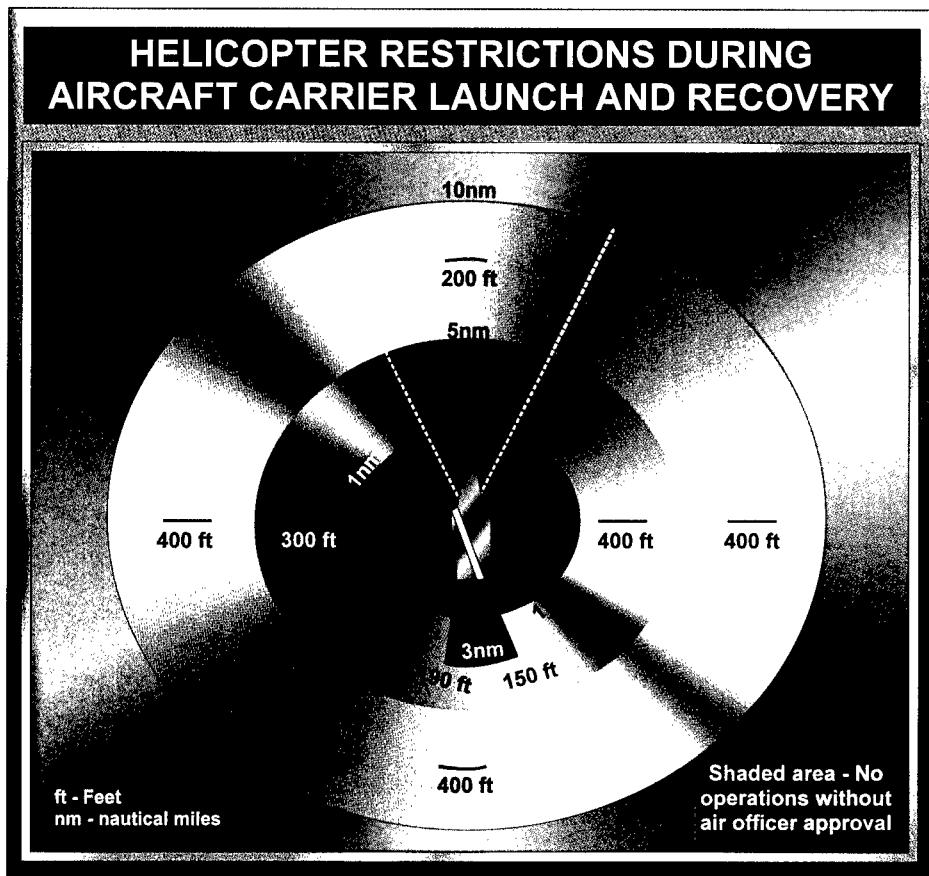
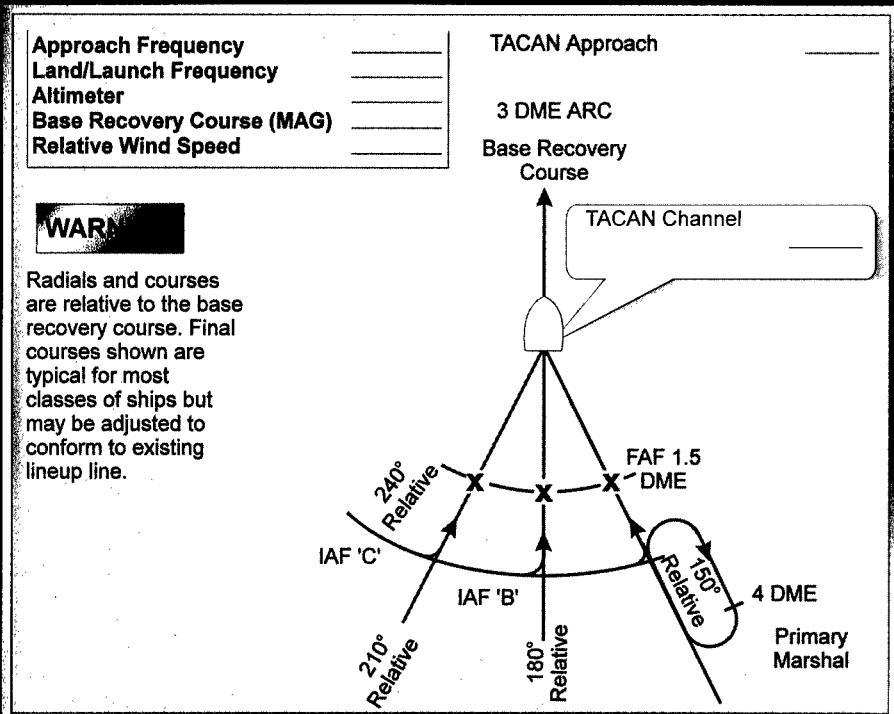


Figure B-A-5. Helicopter Restrictions During Aircraft Carrier Launch and Recovery

**ANNEX B TO APPENDIX B
APPROACH CHARTS FOR AIR-CAPABLE SHIPS**

Annex B to Appendix B

APPROACH CHART AIR-CAPABLE SHIPS TACTICAL AIR NAVIGATION (HELICOPTER)



MISSED APPROACH
If visual contact is not made at missed approach point, climb straight ahead to 400 ft. for 3 minutes of 3 DME, proceed to primary marshal and hold



Category	Distance	Ceiling/Visibility
TACAN	1 nautical mile	200 feet / 1/2 nautical mile
*Radar-Monitored (Ship/Helicopter Radar)	1 nautical mile	200 feet / 1/2 nautical mile

Minimums when radar provides distance information

BRC	Base recovery course	MAP	Missed approach point
DME	Distance measuring equipment	MDA	Minimum descent altitude
IAF	Initial approach fix	TACAN	Tactical air navigation

Figure B-B-1. Approach Chart Air-Capable Ships Tactical Air Navigation (Helicopter)

Approach Charts for Air-Capable Ships

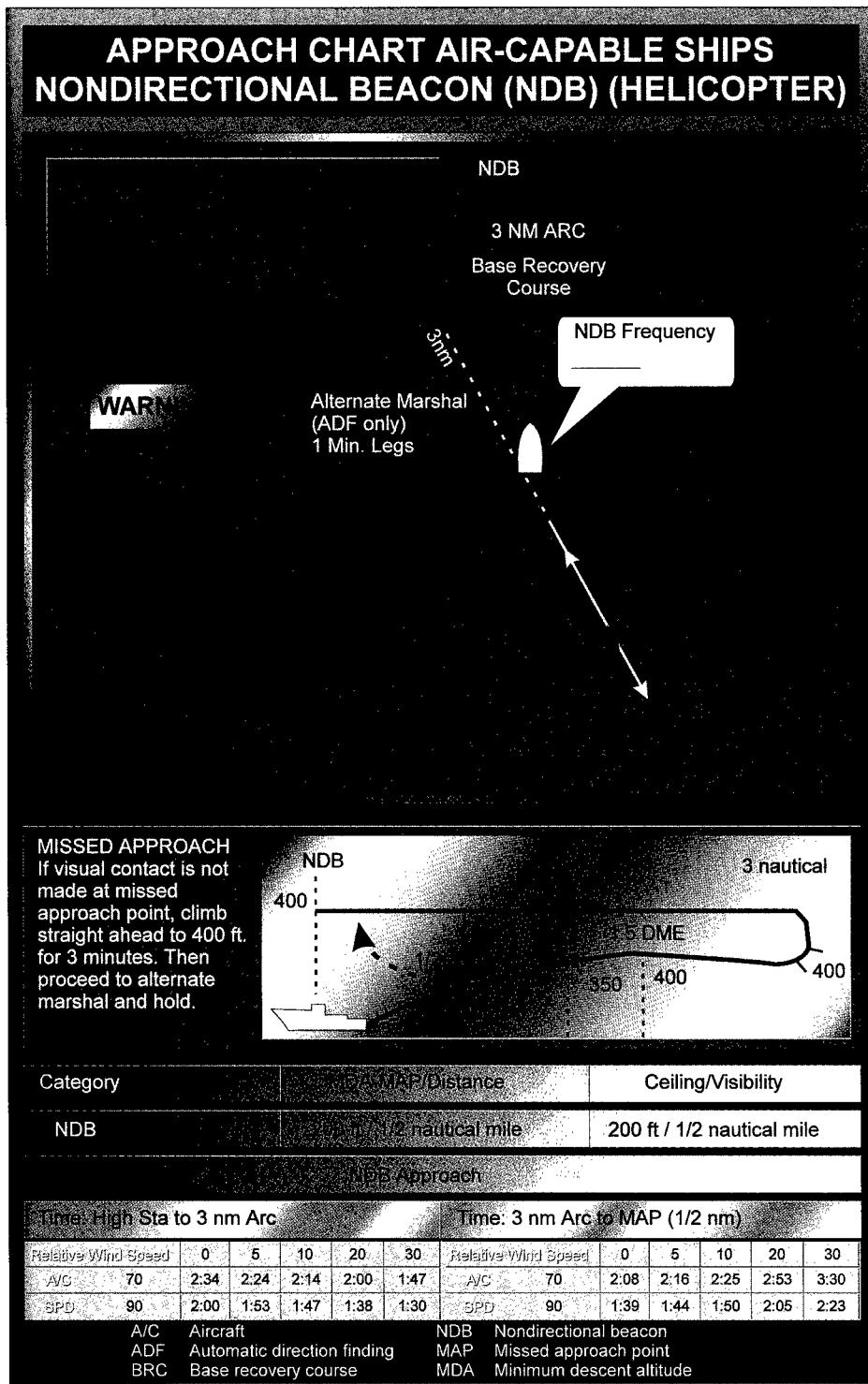


Figure B-B-2. Approach Chart Air-Capable Ships Nondirectional Beacon (NDB) (Helicopter)

Annex B to Appendix B

APPROACH CHART LPH/LHA/LHD NDB AND TACAN OVERHEAD (HELICOPTER)

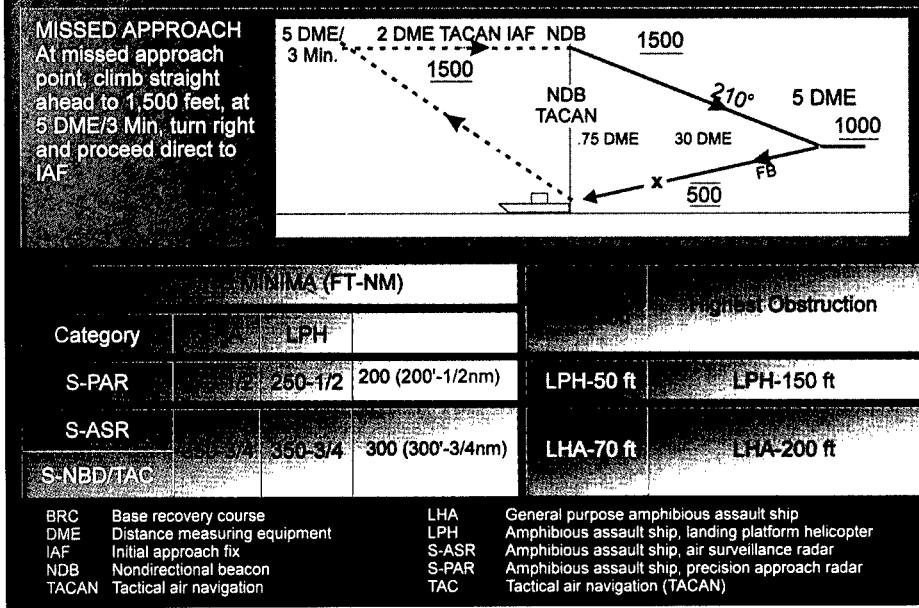
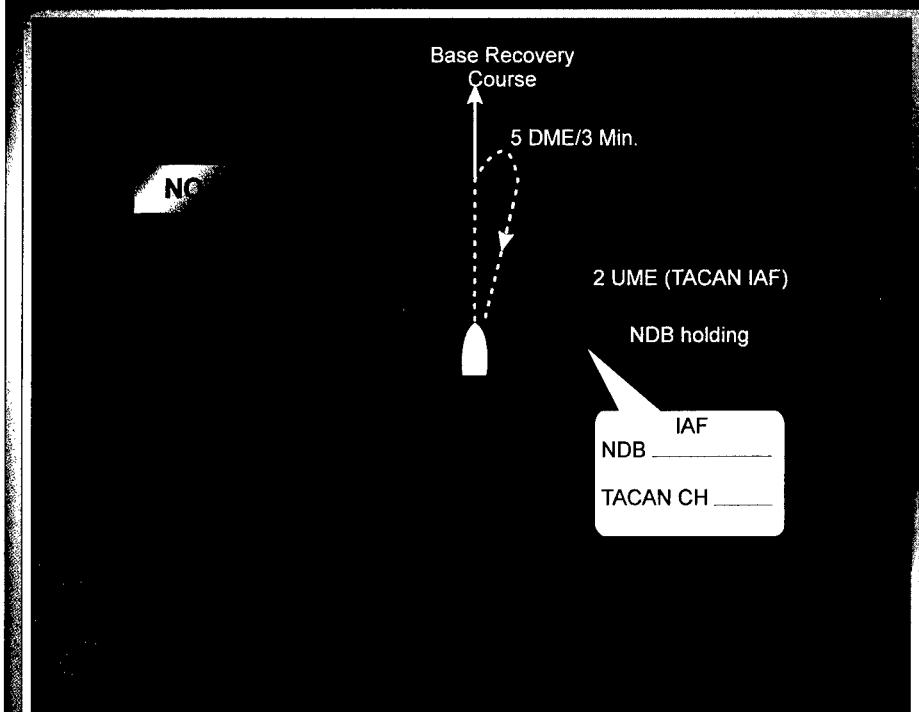


Figure B-B-3. Approach Chart LPH/LHA/LHD NDB and TACAN Overhead (Helicopter)

Approach Charts for Air-Capable Ships

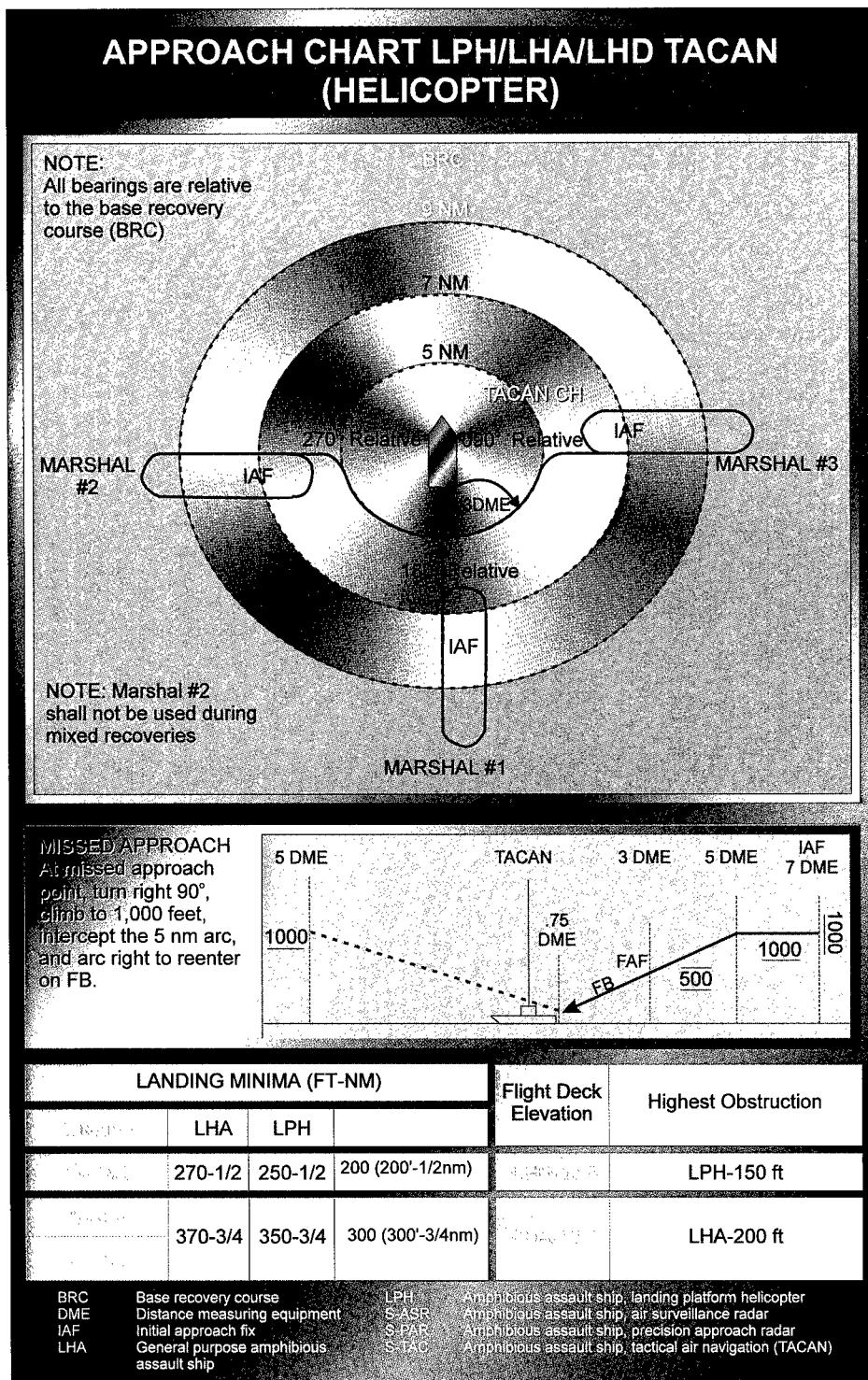
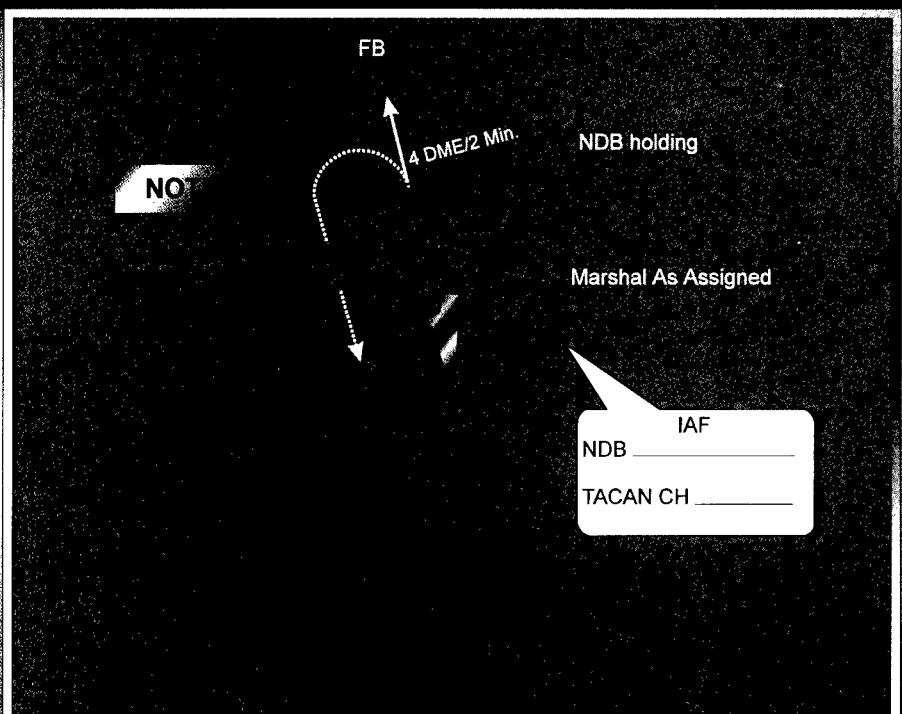


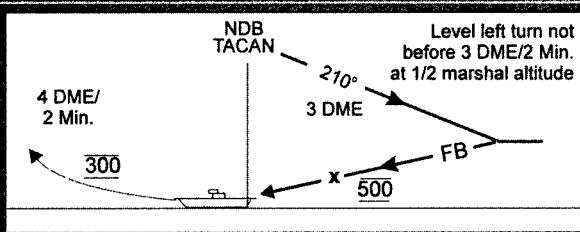
Figure B-B-4. Approach Chart LPH/LHA/LHD TACAN (Helicopter)

Annex B to Appendix B

APPROACH CHART CV-8 NONDIRECTIONAL BEACON AND TACAN OVERHEAD (Helicopter)



MISSED APPROACH/WAVEOFF
If no instructions by 4 DME/2 min. turn downwind, report abeam. If no COMM, reenter FB thru 3 DME FAF. (NDB turn to FB 2 min past abeam)



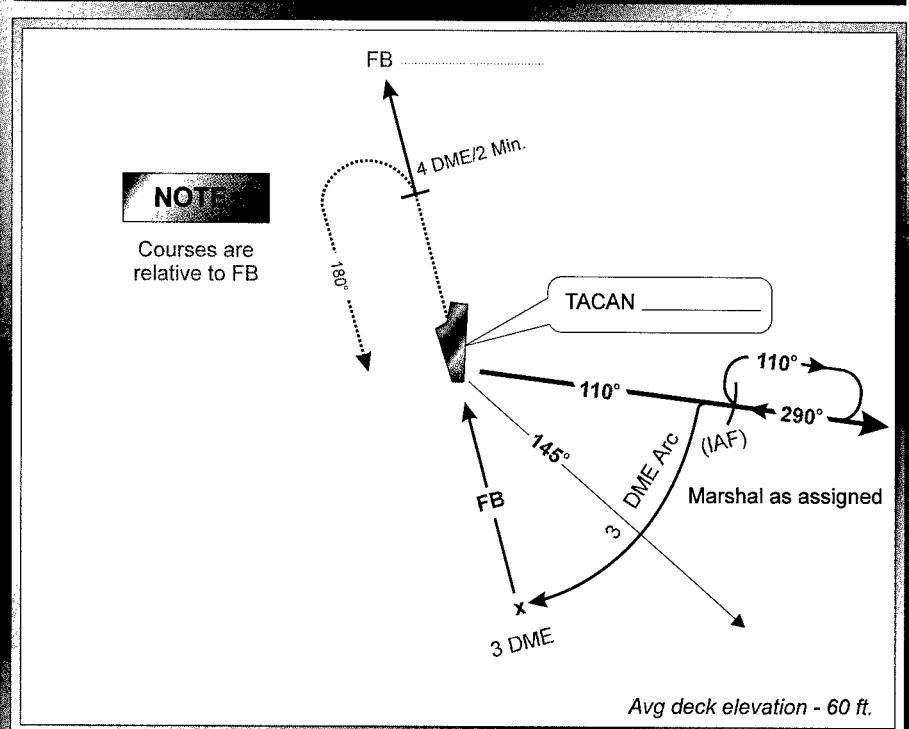
Category	Helicopter
S-PAR	200 (200'-1/2 nm)
S-NDB	240 (300' - 3/4 nm)
S-TAC	

BRC Base recovery course
 COMM Communications
 DME Distance measuring equipment
 IAF Initial approach fix
 NDB Nondirectional beacon
 S-NDB Amphibious assault ship, nondirectional beacon
 S-PAR Amphibious assault ship, precision approach radar
 S-TAC Amphibious assault ship, tactical air navigation

Figure B-B-5. Approach Chart CV-8 Nondirectional Beacon and TACAN Overhead (Helicopter)

Approach Charts for Air-Capable Ships

APPROACH CHART CV-7 TACAN (HELICOPTER)



MISSED APPROACH/ WAVEOFF

MISSING APPROACH/WAVEOFF
If no instructions by 4 DME/2 min. turn downwind, report abeam. If no COMM, reenter FB thru 3 DME FAE



Category	Helicopter	
S-PAR	260'	1/2 nm 200 (200' - 1/2 nm)
S-ASR	300'	3/4 nm 240 (300' - 3/4 nm)
S-TAC		

BRC Base recovery course
 COMM Communications
 DME Distance measuring equipment
 IAF Initial approach fix

NDB	Nondirectional beacon
S-ASR	Amphibious assault ship, air surveillance
S-PAR	Amphibious assault ship, precision attack
S-TAC	Amphibious assault ship, tactical

Figure B-B-6. Approach Chart CV-7 TACAN (Helicopter)

Annex B to Appendix B

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ANNEX C TO APPENDIX B
EMERGENCY PATTERNS AND PROCEDURES

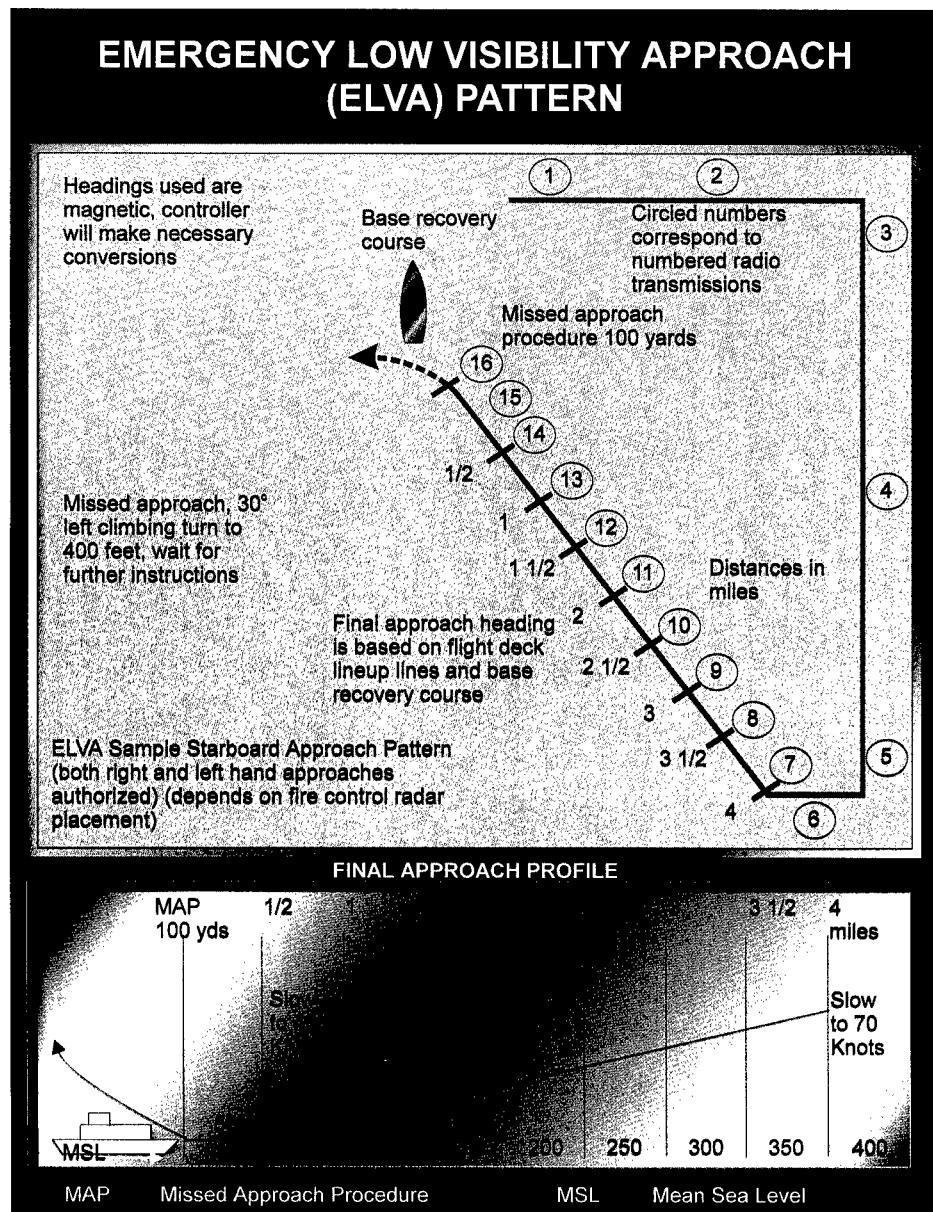


Figure B-C-1. Emergency Low Visibility Approach (ELVA) Pattern

Annex C to Appendix B

EMERGENCY LOW VISIBILITY APPROACH (ELVA) PATTERN — RADIO CALLS

1. (Initial Check-in). This will be a radar assisted approach. Hold your radar contact on the ____ radial; ____ miles from the ship. Altimeter setting is _____. Weather is ceiling _____, visibility _____. Final approach heading will be _____. Winds are ____ degrees port/starboard at ____ knots. Maximum pitch and roll are _____. Read back altimeter setting.
2. Descend/climb and/or maintain 400 feet. Assigned heading is _____.
3. Lost communications procedures follow: If no transmissions are received for 1 minute in the pattern or 15 seconds in final, climb to and maintain 400 feet. Attempt contact on (Secondary). If unable to make contact, squawk Mode III Code 7700 for 1 minute, then Mode III Code 7600. Alternate approach will be tacan channel ____ commencing at 3 miles and 400 feet on the ____ radial. Acknowledge.
4. Missed approach procedures follow: If ship or wake not in sight at missed approach point, turn left 30 degrees immediately; climb to 400 feet and increase airspeed to 90 knots. Report level and on speed and stand by for further instructions.
5. Perform landing checks. Report gear down and locked.
6. Turn right/left to the final bearing _____. maintain 400 feet and slow to 70 knots.
7. Do not acknowledge further transmissions. On final, 4 miles. Commence gradual rate of descent to arrive at 1/2 mile at 50 feet. Maintain 70 knots. Assigned heading is _____. Report ship in sight.
8. (Call sign) 3 1/2 miles, left/right/on approaching centerline. Turn left/right (Corrective heading) or assigned heading is _____. Altitude should be 350 feet.
9. (Call sign) 3 miles, left/right/on approaching centerline. Turn left/right (Corrective heading) or assigned heading is _____. Altitude should be 300 feet.
10. (Call sign) 2 1/2 miles, left/right/on approaching centerline. Turn left/right (Corrective heading) or assigned heading is _____. Altitude should be 250 feet.
11. (Call sign) 2 miles, left/right/on approaching centerline. Turn left/right (Corrective heading) or assigned heading is _____. Altitude should be 200 feet.
12. (Call sign) 1 1/2 miles, left/right/on approaching centerline. Turn left/right (Corrective heading) or assigned heading is _____. Altitude should be 150 feet.
13. (Call sign) 1 mile, left/right/on approaching centerline. Turn left/right (Corrective heading) or assigned heading is _____. Altitude should be 100 feet. Slow to 40 knots.
14. (Call sign) 1/2 mile. Assigned heading is _____. Maintain 50 feet and 40 knots.
15. (Call sign) 800/600/400/200 yards. Left/right/on approaching centerline.
16. (Call sign) at missed approach point if ship or wake not in sight, execute missed approach.

Figure B-C-2. Emergency Low Visibility Approach (ELVA) Pattern — Radio Calls

Emergency Patterns and Procedures

SMOKELIGHT APPROACH PROCEDURES

Smokelight Approach. This approach is used as a last resort when available equipment will not allow ELVA procedures to be used, or when the ship cannot be visually acquired using ELVA procedures and ditching is considered imminent. Both the ship's commanding officer and the pilot in command (or detachment officer in charge) must have agreed to attempt the procedure. The aircraft will be positioned 2 miles behind the ship and proceeds inbound on the 180 degrees radial relative to the BRC. The aircraft will descend at the pilot's discretion to arrive at approximately 40 feet and 40 knots 1 mile behind the ship. Ship's personnel drop smoke or matrix lights every 15 seconds (or other prearranged intervals), and the pilot is kept informed of the number of smokelights in the water. The pilot at the controls follows the smokelights up the ship's wake, adjusting the closure rate until there is visual contact with the ship. HCS will receive a "gear down" report from the pilot before the aircraft maneuvers over the deck.

Annex C to Appendix B

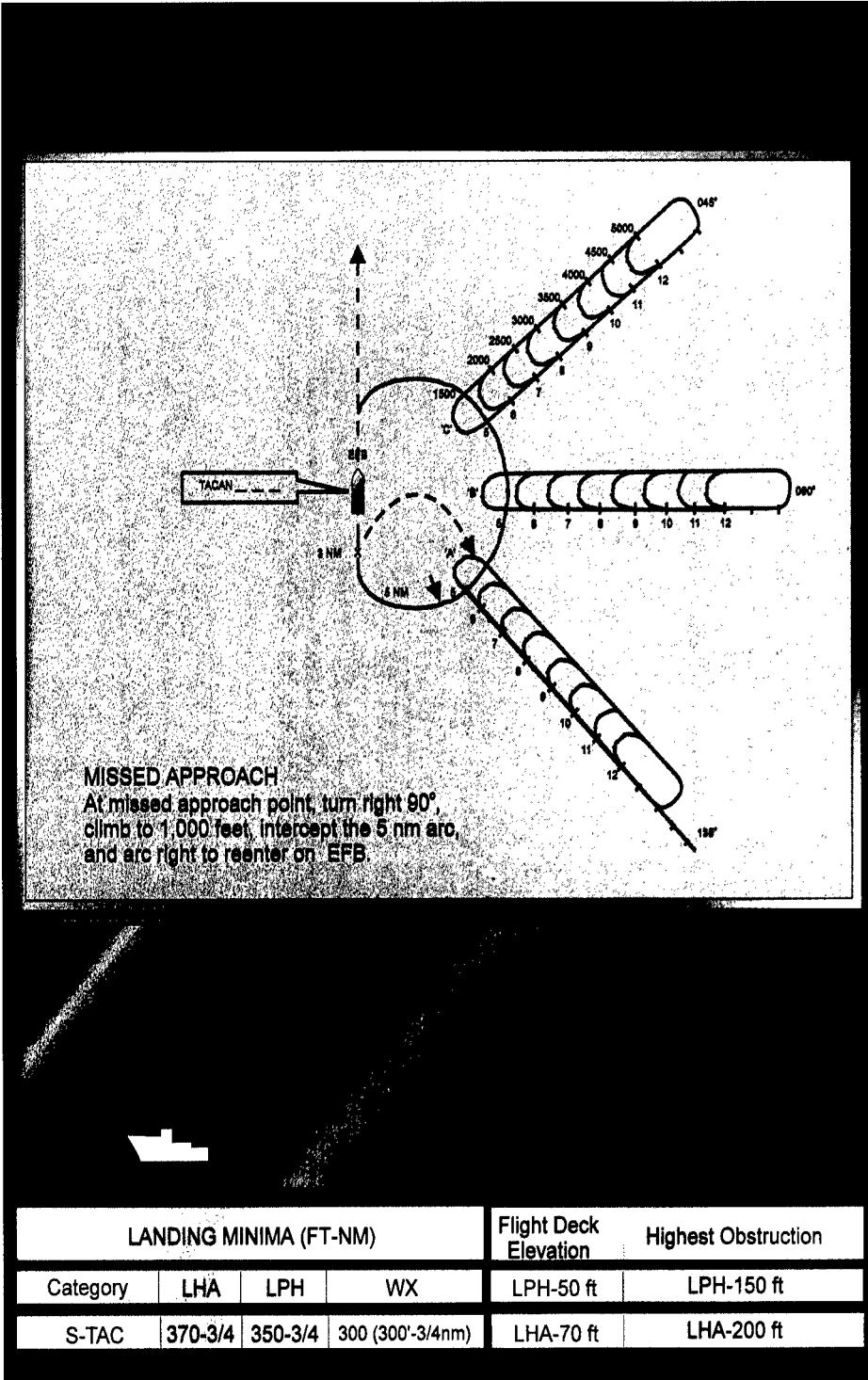


Figure B-C-3. Helicopter Emergency Marshal Pattern

ANNEX D TO APPENDIX B
TYPICAL LANDING PROCEDURES

Annex D to Appendix B

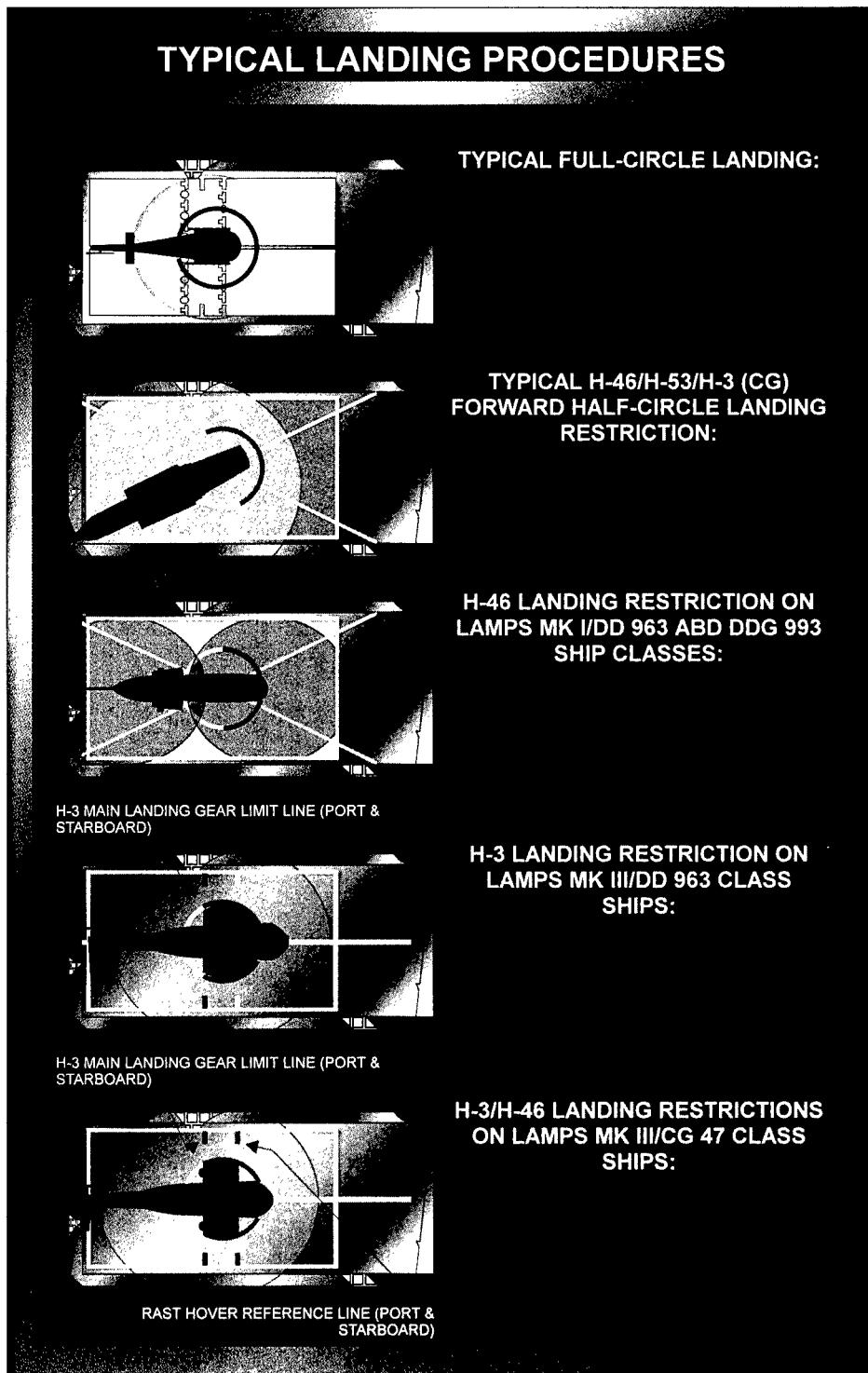


Figure B-D-1. Typical Landing Procedures

Typical Landing Procedures

OPERATION OF TWO HELICOPTERS FROM SINGLE-SPOT SHIP

1. Background

Operational necessity may require the operation of two OH-6 or OH-58 helicopters simultaneously from flight decks configured and marked for single-helicopter operations. Operation with two helicopters simultaneously can be accomplished safely with specific ship-helicopter combinations by spotting or landing the aircraft transversely on the deck in opposing directions. Because these operations entail minimum lateral separation and less than optimum relative wind for one or both of the involved aircraft, use of these procedures is restricted to units specifically identified by the parent Service as having the operational requirement and the requisite proficiency to conduct this operation.

2. Approved Combinations

The following aircraft-ship combinations are statically approved for dual-helicopter operations from a single operating spot:

- a. OH-6 or 58 and FFG-7 Class.
- b. OH-6 or 58 and DDG-993 Class.
- c. OH-6 or 58 and DD-963 Class.
- d. OH-6 or 58 and CG-47 Class.

Note: Reference will be made to the Shipboard Aviation Facilities Resume for ship's flight deck marking and dimensions for dual-helicopter, single-spot operations.

3. Restrictions

The following restrictions apply to simultaneous operation of two helicopters on a single-spot ship:

- a. On departure, the aircraft spotted aft will lift and depart before the forward aircraft lifts off. On recovery, the first aircraft will touch down on the forward spot before the second aircraft hovers over the rear spot.
- b. Operations will be conducted during daylight conditions or with night-vision devices. Dual-helicopter, unaided-vision night landings are not authorized.
- c. When a flight of two AH-58D Kiowa Warriors is landing on a small deck, Non-Recovery, Assistance, Securing, and Traversing Systems (RAST)-equipped guided missile frigate, the first aircraft must land and fold aft-facing blades before the second aircraft lands. Operations must be conducted with relative winds within the general envelope. Operations outside the general envelope must be certified through testing or analysis.

Annex D to Appendix B

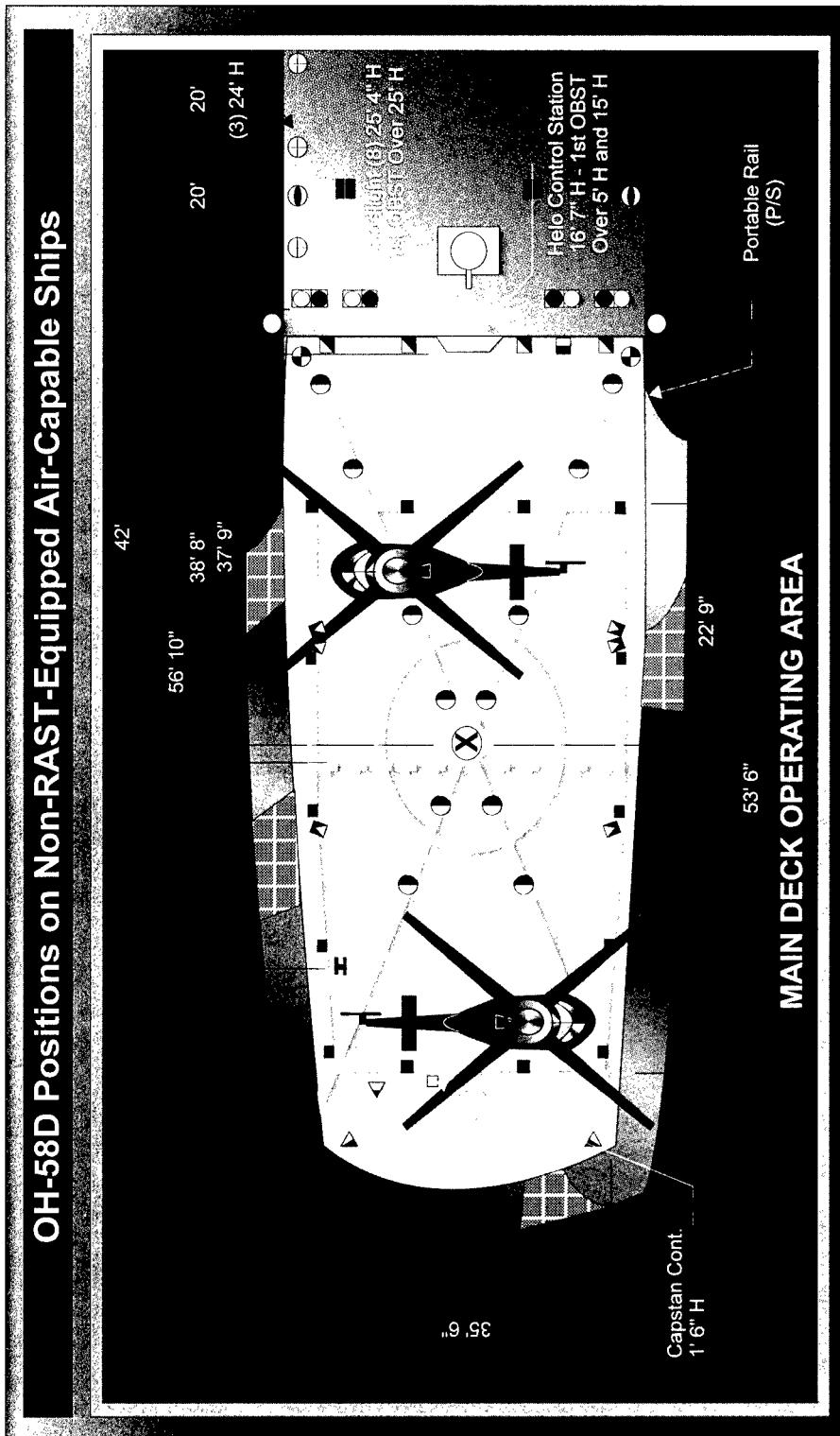
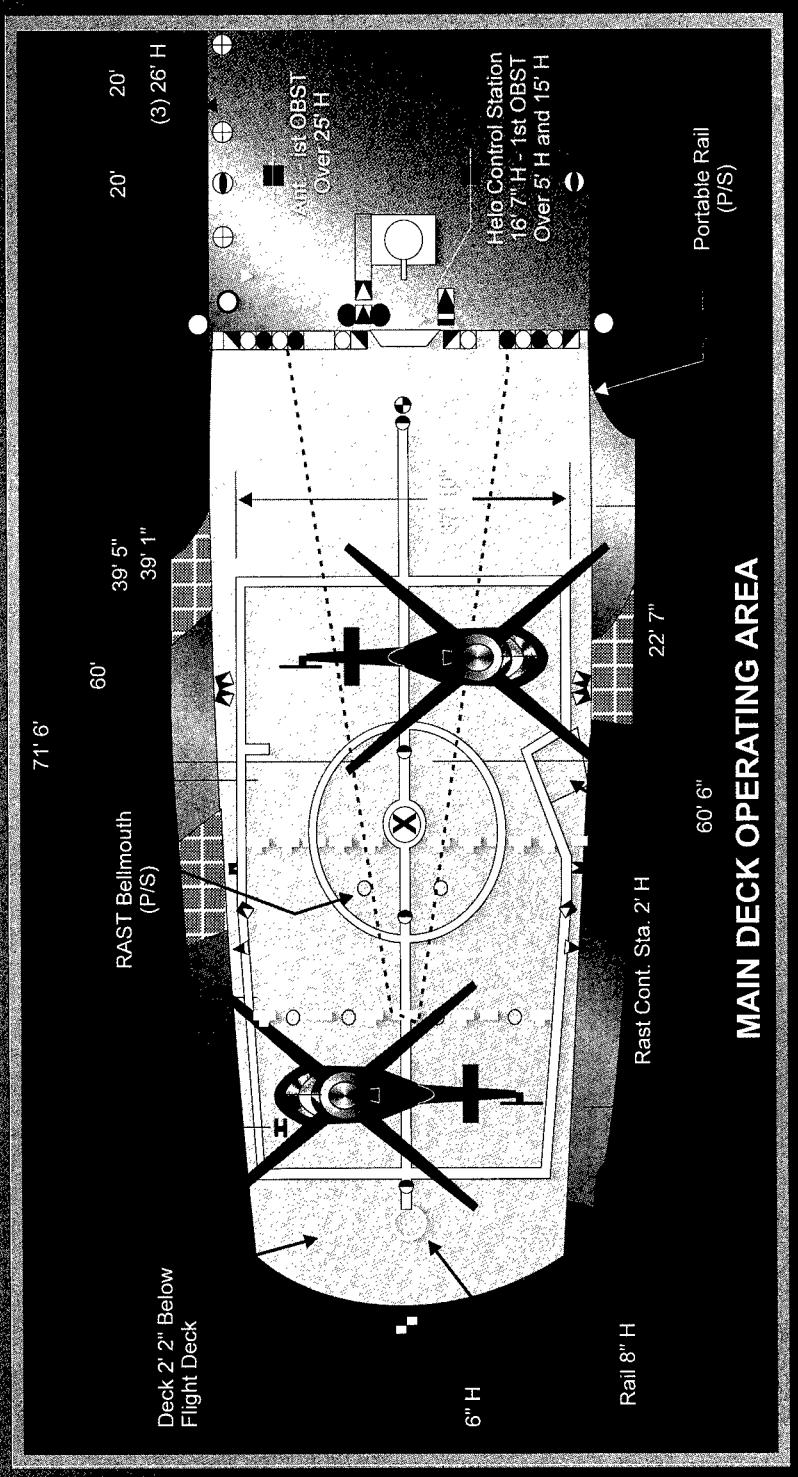


Figure B-D-2. OH-58D Positions on Non-RAST-Equipped Air-Capable Ships

OH-58D Positions for Takeoff and Landing on RAST-Equipped Air-Capable Ships



Typical Landing Procedures

Figure B-D-3. OH-58D Positions for Takeoff and Landing on RAST-Equipped Air-Capable Ships

Annex D to Appendix B

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APPENDIX C

US NAVY SHIP AND MILITARY HELICOPTER INTERFACE AND WIND ENVELOPES

WARNING

This appendix contains information that may change without notice through the joint publication system. If a conflict exists with more specific procedures, those specific procedures will have precedence.

1. USN Ship, USCG Cutter, Military Sealift Command Ship and Military Helicopter Interface

a. Ship and/or helicopter combinations are developed considering rotor diameter, fuselage configurations, landing gear arrangement, maximum gross weight, ship structures, and flight deck obstructions for safe operations. The Shipboard Aviation Facilities Resume (NAEC-ENG-7576) defines the aviation facility certification categories by "levels" and "classes." The "level" of the facility identifies the environmental conditions under which the aircraft can operate and the "class" of the facility identifies the mission the ship can support. Allowable helicopter and/or ship operating combinations are provided in this publication for Navy, Military Sealift Command, and USCG air-capable ships.

b. Ship and/or helicopter combinations are evaluated for EMV and HERO compatibility.

WARNING

Some non-USN helicopters have not been tested in the electromagnetic environment of various ship classes. When conducting non-USN operations, consideration must be given to potential radiation hazards, electromagnetic interference, and EMV effects.

2. Aircraft Wind Limitations

WARNING

Considerable differences may exist between the flight deck winds and those measured by bridge-level anemometers. However, aircraft wind limitations contained in the appendix and applicable shipboard operating bulletins are based on winds measured by the windward bridge-level anemometer. When operating at or near the outer wind limits, the probability of damage increases sharply when wind gusts exceed 10 knots. Also the maximum safe wind in conjunction with excessive ship pitch and/or roll can make flight operations unacceptably hazardous; therefore, operations shall be adjusted accordingly. Common sources of turbulence are: (1) stack gasses and wash; (2) ship superstructures; (3) deck protrusions; and (4) rotor wash or jet blast caused by the takeoff and landing of adjacent aircraft.

a. The NAWCAD, Patuxent River, Maryland, conducts dynamic interface (DI) testing of all helicopter and ship class combinations to develop all aspects of shipboard helicopter dynamic operational compatibility. DI testing investigates the

Appendix C

effects of ship airwake, ship motion, ship marking and lighting, and effects of ship and/or helicopter operations. The significant result of DI testing is the development of operational launch and recovery, engage or disengage, and HIFR envelopes, each of which depict the wind speed and direction and ship motion conditions conducive to producing consistently safe shipboard operations. DI certifications of each ship and/or helicopter combination are required before conducting any shipboard flight operations beyond the bounds of Figures C-1 and C-2. Aircraft that have not undergone DI testing

or that do not have a DI-certified envelope are restricted to the use of the general launch and recovery wind limitations charts (Figures C-1 and C-2) for the appropriate class ship. Comments or questions about ship and/or helicopter interface, electromagnetic environment, and aircraft wind limitations should be addressed to:

Commander
Naval Air Systems Command (PMA251D)
Naval Air Systems Command Headquarters
1421 Jefferson Davis Hwy
Arlington, VA 22243-5120

US Navy Ship and Military Helicopter Interface and Wind Envelopes

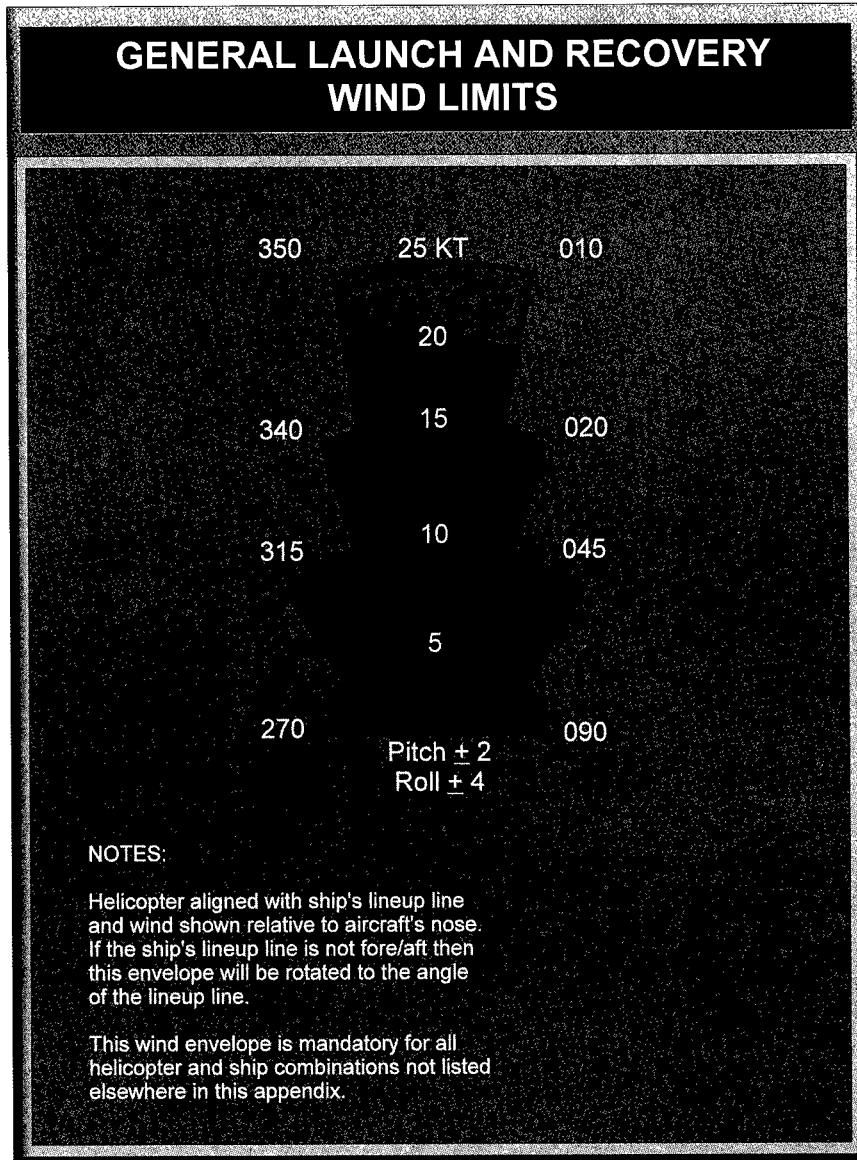


Figure C-1. General Launch and Recovery Wind Limits

Appendix C

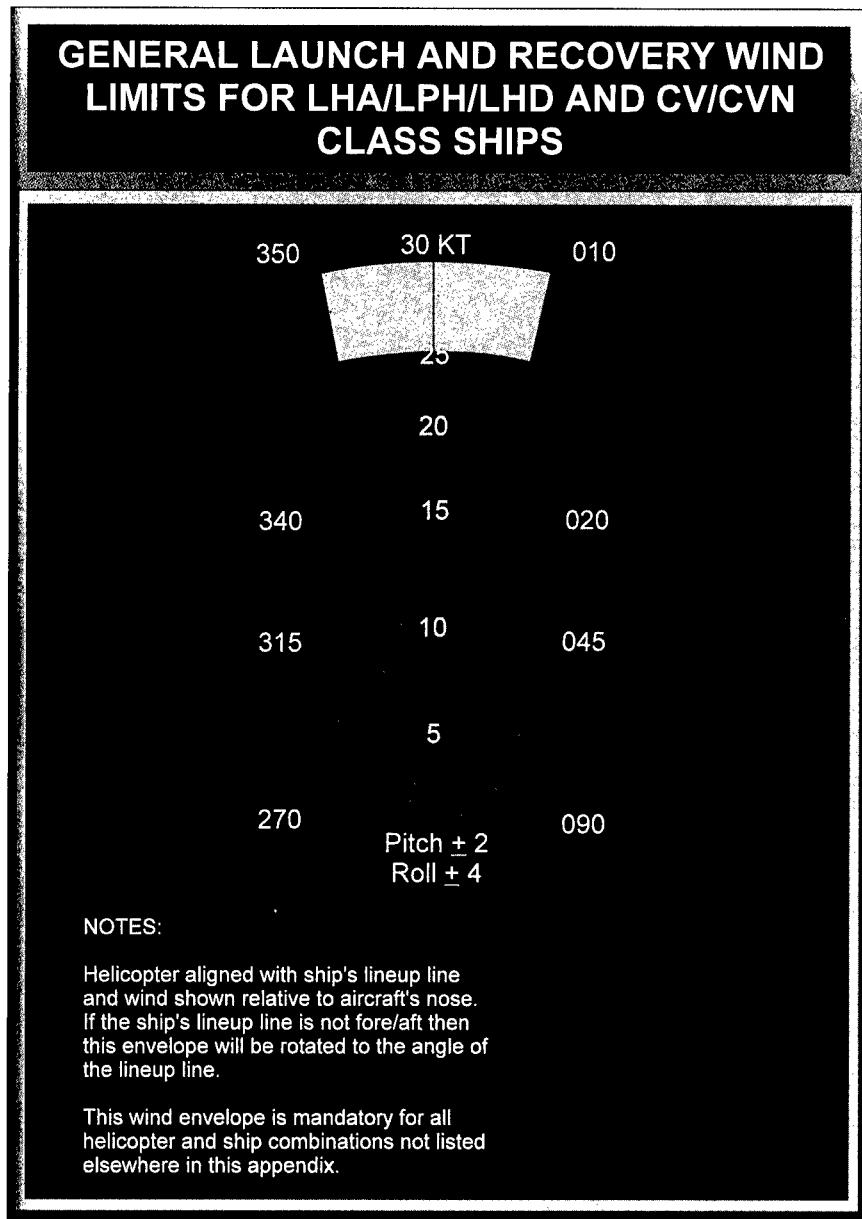


Figure C-2. General Launch and Recovery Wind Limits for LHA/LPH/LHD and CV/CVN Class Ships

APPENDIX D

ORDNANCE

- Annex A Permissible Stowage of Ammunition and Explosives
B Aviation Ordnance Technical Publications and Instructions Library Checklist
C Joint Helicopter Handling, Qualification, and Certification for Conventional Aviation Ordnance Devices
D Weapons Loading, Strikedown, Downloading, and Recovery
E Munitions Cookoff Time Summary
F Helicopter Weapons Configuration — By Service

WARNING

This appendix contains information that may change without notice through the joint publication system. If a conflict exists with more specific procedures, those specific procedures will have precedence.

Appendix D

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ANNEX A TO APPENDIX D
PERMISSIBLE STOWAGE OF AMMUNITION
AND EXPLOSIVES

Annex A to Appendix D

PERMISSIBLE STOWAGE OF

TYPE OF AMMUNITION	TYPE OF MAGAZINE						
	PROJECTILES	FIXED AMMO	PROPELLANT	PROPELLANT	PROPELLANT	PROPELLANT	FUZES
& ROCKETS	GUN & ROCKET	ROCKET TYPE	GUN, BAG	GUN, CASED	Liquid FUEL		
HEADS							
Actuator, Torpedo, F/Arming Device MK 6 Mod 0		X					X
Arming and Firing Mechanism MK-1 Mod 1							X
Arming Device, MK-2 and -3, F/Torpedo							X
Bag, Loading Assy F/4. 2" Mortar Cartridge							X
Base Couplings, w/primer							X
Bolts, Explosive		X					X
Bombs, Chemical Agent							
Bombs, HE Loaded, Depth, Frag, GP, SAP							
Boosters and Auxiliary Boosters w/o Detonators, HE Loaded, All Types							
Boosters and Auxiliary Boosters w/Detonators, HE Loaded, All Types							X
Caps, Blasting							
Cartridges, 40mm, 3" and 5", Blank Saluting		X		X			
Cartridges, Delay, F/AC		X					X
Cartridges, Engine Starter, MXU-4A/A			X	X	X		

Figure D-A-1. Permissible Stowage of

Permissible Stowage of Ammunition and Explosives

AMMUNITION AND EXPLOSIVES

TYPE OF MAGAZINE													REMARKS
PYROTECHNIC	CHEMICAL	BOMB TYPE	SMA LL ARMS	WA RHEADS	MISSILES	GRENADE ASSEMBLED	DETONATOR LOCKERS	READY SERVICE	DEMOLITION	DEMOLITION MATERIAL	SPECIAL LOCKERS		
X		X											
X		X											
			X										
X			X										
X			X										
X			X										
		X											
		X	X										
		X	X										
					X								
			X										
			X										

Ammunition and Explosives

Annex A to Appendix D

PERMISSIBLE STOWAGE OF

TYPE OF AMMUNITION PROJECTILES & ROCKET HEADS	TYPE OF MAGAZINE						
	FIXED AMMO GUN & ROCKET HEAD	PROPELLANT GUN, BAG	PROPELLANT GUN, CASED	PROPELLANT GUN, LIQUID FUEL	PROPELLANT GUN, LIQUID FUEL	PROPELLANT GUN, LIQUID FUEL	FUSES
Cartridges, Explosive, F/Torpedo MK-45	X						X
Cartridges, Grenade, Rifle and Carbine	X						X
Cartridges, Impulse, F/AC	X						X
Cartridges, Impulse, 3" F/SDCP	X			X			
Cartridges, Impulse, F/Gas Gen, 25 Man Life Raft		X	X	X			
Cartridges, 20mm, AP-T, TP, LPT, FCT	X						X
Cartridges, 20mm, Incend, API, HE Loaded	X						
Cartridges, 30mm, EF	X						
Cartridges, Photoflash							
Cartridges, Mortar, HE, III, TP, Leaflet and Window	X						
Cartridges, Mortar, WP Loaded							
Cartridges, 40mm Riot Control							
Cartridges, 3" 50 Cal, 76mm, Service and Training	X						
Cartridges, 40mm, Service, Less Chemical	X						
Cartridge Sets, Impulse, F/CAD Devices	X						

Figure D-A-1. Permissible Stowage of

Permissible Stowage of Ammunition and Explosives

AMMUNITION AND EXPLOSIVES

TYPE OF MAGAZINE												REMARKS
PYROTECHNIC	CHEMICAL	BOMB TYPE	SMALL ARMS	WARHEADS	MISSILES	GRENADE ASSEMBLED	DETONATOR LOCKERS	READY SERVICE	DETONATORS	DEMOLITION MATERIAL	SPECIAL LOCKERS	
X		X										
X		X										
X		X										
X		X										
								X				
								X				
X										Separate Stowage		
X												
	X											
	X								X			
									X			
X	X	X										

Ammunition and Explosives (cont'd)

Annex A to Appendix D

PERMISSIBLE STOWAGE OF

TYPE OF AMMUNITION	TYPE OF MAGAZINE						
	PROJECTILES	FIXED AMMO & GUN	ROCKET HEADS	PROPELLANT, ROCKETS	PROPELANT, GUN, BAG	PROPELLANT, GUN, CASED	FUZES & LIQUID FUEL
Cartridges, 3, 5, 6, 8" Short				X	X	X	
Cartridges, Signal, F/Practice Bombs							
Cartridges, Small Arms, All Calibers and Types 1/	X						X
Catapult, Aircraft Seat Ejection				X		X	
Cases, U/W Mines and Depth Charges, HE Loaded							
Charges, Demolitions, Assemblies, Blocks, Flex, Linear, & Sheet							
Charge, Demolition (Shaped) MK-45/-47/-74							
Charge, Propellant, Guns 5, 6, 8" Cased, Full, Reduced				X	X	X	
Charge, Propellant, Guns 8, 16" Bag, Full, Reduced				X	X	X	
Charges, Spotting, F/Practice Bombs and Mines	X						X
Chemical Agent, FS Smoke							
Cluster, Canister, Chemical, Riot Control							
Cluster, Projector, Launcher, MK-14				X	X	X	
Container and Cartridge Set, Line Throwing, .45 Cal		X					X

Figure D-A-1. Permissible Stowage of

Permissible Stowage of Ammunition and Explosives

AMMUNITION AND EXPLOSIVES

TYPE OF MAGAZINE												REMARKS
PYROTECHNIC	CHEMICAL	BOMB TYPE	S M A L L	W A R E H E A D S	M I S S I L E S	G R E N A D E	D E T O N A T O R	R E A D Y	D E M O L I T I O N	M A T E R I A L	S P E C I A L	
								X				
X		X										
X		X										
			X	X								
									X			
			X	X	X			X				
X			X									
	X											
	X											
X			X					X				

Ammunition and Explosives (cont'd)

Annex A to Appendix D

PERMISSIBLE STOWAGE OF

TYPE OF AMMUNITION & ROCKET HEADS	TYPE OF MAGAZINE						
	PROJECTILES	FIXED AMMO	PROPELLANT, GUN & ROCKET ROCKET HEAD	PROPELLANT, ROCKET TYPE	PROPELLANT, GUN, BAG	PROPELLANT, GUN, CASED	PROPELLANT, LIQUID FUEL
Container and Charge Set, Line Throwing, 2.75" Rocket		X	X	X	X		
Control Unit, Parachute		X					X
Cord, Detonating, All Types		X					X
Cryptographic Equipment Destroyers							
Cutters, Cartridge Actuated		X					X
Cutter, HE, MK-3, Mod 1							
Demolition Kit, Bangalore Torpedo							
Depth Charge Antipersonnel, MK-40							
Destructor Charges, Explosive		X					X
Destructor, Incendiary							
Detonation Simulators							
Detonators, Detonators Assemblies, Electric Percussion, Stab							
Dispensers, Chaffeye, MJU-5B		X					X
Dispensers and Bombs, Complete, CBU, Less CBU-15, -22, and -55/b							

Figure D-A-1. Permissible Stowage of

Permissible Stowage of Ammunition and Explosives

AMMUNITION AND EXPLOSIVES

TYPE OF MAGAZINE												REMARKS
PYROTECHNIC	CHEMICAL	BOMB TYPE	S M A L L	W A R E H E A D S	M I S S I L E S	G R E N A D E	D E T O N A T O R	R E A D Y S E R V I C E	D E M O L I T I O N M A T E R I A L	S P E C I A L L O C K E R S		
X			X									
X		X		X			X					
									X	Separate Stowage		
X		X					X					
								X	X			
		X	X									
		X	X									
X			X				X					
								X	Separate Stowage			
X	X					X				Separate Stowage		
							X					
X		X										
	X	X										

Ammunition and Explosives (cont'd)

Annex A to Appendix D

PERMISSIBLE STOWAGE OF

TYPE OF AMMUNITION	TYPE OF MAGAZINE						
	P R O J E C T I L E S	F I X E D A M M O	P R O P E L L A N T, G U N & R O C K E T H E A D S	P R O P E L L A N T, R O C K E T T Y P E	P R O P E L L A N T, G U N, B A G	P R O P E L L A N T, G U N, C A S E D	F U Z E S L I Q U I D F U E L
Dispensers and Bombs, Complete, CBU-15, -22, and -55/b	X						
Dispensers and Bombs, Practice Weapon, CBU M-20		X					X
Document Destroyers							
Dynamite, Military, M1							
Dynamite, 40% Nitro Gel 2/							
Exercise Heads, Mk 10 Mod 0 F/GMS							
Exercise Heads, F/GM, Less MK-10							
Exercise Sections Assembly, MK-17, F/GMS							
Exploder Mechs, MK-11 and Mods F/Torpedo MK-27							X
Explosive Blocks, Torpedo							X
Explosive Drivers		X					X
Explosive Fittings, Less MK-26							
Explosive Fitting, MK-26 F/SUBROC							X
Explosive Switch, MK-17 Mods 1 and 2							X
Explosive Train, F/Torpedo MK-46, Service & Practice							X

Figure D-A-1. Permissible Stowage of

Permissible Stowage of Ammunition and Explosives

AMMUNITION AND EXPLOSIVES

TYPE OF MAGAZINE												REMARKS
PYROTECHNICAL	CHEMICAL	BOMB TYPE	SMALL ARMS	WARHEADS	MISSILES ASSEMBLED	GRENADE LOCKERS	DETONATORS	READY SERVICE	DEMOLITION MATERIAL	SPECIAL LOCKERS		
		X										
X			X									
X								X				
									X			
									X		Separate Stowage	
		X	X									
X			X									
		X	X									
							X					
X			X									
						X						

Ammunition and Explosives (cont'd)

Annex A to Appendix D

PERMISSIBLE STOWAGE OF

TYPE OF AMMUNITION	TYPE OF MAGAZINE						
	PROJECTILES & ROCKET HEADS	FIXED AMMO GUN & ROCKET ROCKET TYPE	PROPELLANT GUN, ROCKET	PROPELLANT GUN, BAG	PROPELLANT GUN, CASED	PROPELLANT LIQUID FUEL	FUSES
Extensions, Fuse, Bomb, Tetryl or Comp B Loaded							X
File Destroyer, Incendiary							
Firing and Arming Mechs. F/U/W Sound Signals							X
Firing Devices, Firing Device Set, Demolitions		X					X
Firing Mech. MK-24, F/U/W Mine							X
Flares, All Types							
Fog Oil for Smoke Pots							
Fuze, Blasting, Time		X					X
Fuzes, Bombs, All Types							X
Fuzes, F/Missiles, All Types w/o Boosters							X
Fuzes, Hand Grenades and Mines AT Combination							X
Fuzes, Projectile, Base Det, MT w/Boosters, PD Less MK-66 Mod 0, Aux Det. Less MK-89, Fuze and Adapter Assemblies							X
Fuzes, Projectile, MT w/o, Boosters PD MK-66 Mod 0, Aux Det. MK-89		X					X
Fuzes, U/W Sound Signal							X

Figure D-A-1. Permissible Stowage of

Permissible Stowage of Ammunition and Explosives

AMMUNITION AND EXPLOSIVES

TYPE OF MAGAZINE												REMARKS
PYROTECHNIC	CHEMICAL	BOMB TYPE	S M A L L A R M S	W A R E H E A D S	M I S S I L E S	G R E N A D E	D E T O N A T O R	R E A D Y S E R V I C E	D E M O L I T I O N M A T E R I A L	S P E C I A L L O C K E R S		
												X Separate Stowage
								X				
X		X										
								X				
X								X				
X								X				
X		X										
							X					
							X					
							X					
X		X										
							X					

Ammunition and Explosives (cont'd)

Annex A to Appendix D

PERMISSIBLE STOWAGE OF

TYPE OF AMMUNITION	TYPE OF MAGAZINE						
	PROJECTILES	FIXED AMMO	PROPELLANT,	PROPELLANT,	PROPELLANT,	PROPELLANT	FUZES
& ROCKET HEADS	GUN & ROCKET	ROCKET TYPE	GUN, BAG	GUN, CASED	Liquid FUEL		
Generators, Catalyst, WMU-1/B, -2B, -6B							
Generators, Gas Pressure			X	X	X		
Grenades, Hand, Chemical, Riot, Tear Gas, WP							
Grenades, Hand, Frag.		X					
Grenades, Hand III, HC Smoke, Colored Smoke		X					
Grenades, Hand, Incendiary (Thermite)							
Grenades, Offensive, with or without Fuze							
Grenades, Hand Practice and Rifle, AT Practice, Fuzed			X				
Grenades, Hand and Rifle, Colored Smoke							
Grenades, Rifle, HEAT							
Grenades, Rifle, WP							
Guided Missiles, Practice and Tactical, Less TALOS		X					
Guided Missile, SHRIKE, Training		X					
Guided Missile, SHRIKE, Exercise							
Guided Missile, TALOS, Practice and Tactical							

Figure D-A-1. Permissible Stowage of

Permissible Stowage of Ammunition and Explosives

AMMUNITION AND EXPLOSIVES

TYPE OF MAGAZINE												REMARKS
PYR	CHE	BOM	SMA	WAR	MIS	GRE	DET	REA	DEM	SPE	CIAL	
OT	EMI	MB	LL	HEAD	ILE	NADE	ONATOR	DY	OLITI	CIAL		
CH	IC	AL	TY	PE	AR	MS	AS	SE	ER	LO	CK	
N	I	C	E	T	A	R	M	B	L	E	R	
X								X				
	X					X						
		X	X			X						
X					X							
									X	Separate Stowage.		
		X	X	X		X						
			X		X					3/		
X					X							
		X			X							
	X				X							
				X			X	X	X			
				X			X					
				X			X					
				X			X					

Ammunition and Explosives (cont'd)

Annex A to Appendix D

PERMISSIBLE STOWAGE OF

TYPE OF AMMUNITION	TYPE OF MAGAZINE						
	PROJECTILES	FIXED AMMO & GUN	ROCKET HEADS	PROPELLANT, ROCKET & ROCKET TYPE	GUN, BAG	GUN, CASED	PROPELLANT, LIQUID FUEL
Guided Missile, HARPOON, Tactical 4/							
Guided Missile, PENGUIN					X		
Guided Weapon, TOMAHAWK, Tactical 4/							
Guided Weapon, Tactical, WALLEYE							
Guided Weapon, WALLEYE, Mk-2 Practice		X					
Guided Weapon, WALLEYE, Mk-4 Practice		X					
Hellfire Missile							
Igniters, Bomb, WP							
Igniter Cylinders, Flame Throwers		X					X
Igniters, Igniter Assemblies, F/Torpedoes							X
Igniters, Sea Water Activated, F/Torpedoes MK-46							
Igniter, Time Blasting Fuze		X					X
Initiators, Cartridge		X					X
Ignition Separation Assemblies, HE Loaded							X
Igniters, JATO Units							X

Figure D-A-1. Permissible Stowage of

Permissible Stowage of Ammunition and Explosives

AMMUNITION AND EXPLOSIVES

TYPE OF MAGAZINE											REMARKS
PYROTECHNIC	CHEMICAL	BOMB TYPE	S M A L L A R M S	W A R H E A D S	M I S S I L E S	G R E N A D E	D E T O N A T O R	R E A D Y S E R V I C E	D E M O L I T I O N M A T E R I A L	S P E C I A L L O C K E R S	
				X				X			
				X	X						
				X				X			
		X	X								
				X				X			
				X				X			
				X							
		X									
X			X								
	X								X		
X			X								
X			X								

Ammunition and Explosives (cont'd)

Annex A to Appendix D

PERMISSIBLE STOWAGE OF

TYPE OF AMMUNITION	TYPE OF MAGAZINE						
	PROJECTILES & ROCKET HEADS	FIXED AMMO & GUN	ROCKET TYPE	ROPELLANT, ROCKET	ROPELLANT, GUN, BAG	ROPELLANT, CASED	FUSES & LIQUID FUEL
Initiator, Firebomb MK-13 Mod 0							X
Launcher and Cartridges, Chemical Agent							
Lead, Flexible, Explosive, MK-11 Mod 0							X
Marker Kit, Location, MK-19							
Markers, Location, Marine and Sub.							
Markers, Marine, MK-2 Mods 0 and 1							
Mines, AT, and AP, M18/T48 Type							
Mines, AP, M2, M16, M26 Types			X				
Mines, Underwater, w/o Detonators			X				
Primer Dets. F/Bomb Fuzes, All Types							X
Primers, All Types							
Projectiles, 5-38, 5-54, 6-47 Cals., III, Chaff, Window, Non-Frag	X						
Projectiles, 5-38, 5-54 Cals. WP	X						
Projectiles, 5" thru 16", HE Loaded	X						

Figure D-A-1. Permissible Stowage of

Permissible Stowage of Ammunition and Explosives

AMMUNITION AND EXPLOSIVES

TYPE OF MAGAZINE											REMARKS
PYROTECHNIC	CHEMICAL	BOMB TYPE	SMALL ARMS	WARHEADS	MISSILES	GRENADE ASSEMBLED	DETONATOR LOCKERS	READY SERVICE	DEMOLITION MATERIAL	SPECIAL LOCKERS	
								X			
X									X		
X									X		
X									X		
X								X			
	X	X							X		
	X	X					X				
		X									
X								X			
X								X			
									X		

Ammunition and Explosives (cont'd)

Annex A to Appendix D

PERMISSIBLE STOWAGE OF

TYPE OF AMMUNITION	TYPE OF MAGAZINE						
	PROJECTILES & ROCKET HEADS	FIXED AMMO GUN & ROCKET ROCKET HEADS	PROPELLANT, ROCKET TYPE	PROPELLANT, GUN, BAG	PROPELLANT, GUN, CASED	PROPELLANT, LIQUID FUEL	FUSES
Projectiles, 5", 6" and 8", Smoke Puff	X						
Propellant Assembly F/Torpedo MK-46				X X X			
Removers, Aircraft Canopy		X					X
Rocket, 66 mm, Incendiary 5/							
Rockets, Assembled, with/without Fuze		X					
Rocket Engines, Liquid, All Types				X			X
Rocket Motors, Solid, All Types				X X X	X		
Safety and Arming Devices, with less than 0.1 Pound HE		X					X
Safety and Arming Devices, with more than 0.1 Pound HE							X
Self-Destruct Charges (Destructor Charges F/GM)							X
Signal, MK-25 f/Drill Mines							
Signals, Signal Kits, All Types, Except U/W Sound							
Signals U/W Sound, w/o Fuze, Except MK-64							
Signal, U/W Sound, MK-64 Mod 0							X
Simulators, Other than Detonation Simulators							

Figure D-A-1. Permissible Stowage of

Permissible Stowage of Ammunition and Explosives

AMMUNITION AND EXPLOSIVES

TYPE OF MAGAZINE													REMARKS
PYROTECHNIC	CHEMICAL	BOMB TYPE	SMALL ARMS	WARHEADS	MISSILES	GRENADE LOCKERS	DETTONATOR LOCKERS	READY SERVICE	DEMOLITION MATERIAL	DEMOLITION MATERIAL	SPECIAL LOCKERS		
X								X					
X		X											
									X				
								X					
X			X										
		X							X				
X									X				
		X	X										
X													

Ammunition and Explosives (cont'd)

Annex A to Appendix D

PERMISSIBLE STOWAGE OF

TYPE OF AMMUNITION	TYPE OF MAGAZINE						
	PROJECTILES	FIXED AMMO	PROPELLANT,	PROPELLANT,	PROPELLANT,	PROPELLANT	FUZES
& ROCKET HEADS	GUN & ROCKET HEAD	ROCKET TYPE	GUN, BAG	GUN, CASED	Liquid FUEL		
Simulator, Projectile, Air Burst f/Discharger, Smoke Puff							
Smoke Pots, Fog Oil, Fuel Oil, Ground or Floating							
Smoke Pots, HC Loaded Ground or Floating							
Smoke Tracking Devices, F/LD. Bombs							
Spray Guns, CN, Training							
Squibs, Squib Assemblies		X				X	
STINGER Missile							
Thrusters, Cartridges Actuated		X				X	
Torpedoes, Assembled, Service							
Torpedoes, Assembled, Exercise MK-37, -44, and -45							X
Torpedoes, ASROC, Exercise		X					
Toxic Gas Sets, Training							
War Gas, Identification Sets							
Warheads, Exercise, F/GMS							
Warheads, HE Loaded, F/GMS	X						

Figure D-A-1. Permissible Stowage of

Permissible Stowage of Ammunition and Explosives

AMMUNITION AND EXPLOSIVES

TYPE OF MAGAZINE												REMARKS
PYROTECHNIC	CHEMICAL	BOMB TYPE	S M A L L ARMS	W A R E A D S	M I S S I L E S	G R E N A D E	D E T O N A T O R	R E A D Y S E R V I C E	D E M O L I T I O N	M A T E R I A L	S P E C I A L L O C K E R S	
X												
X								X				
	X							X				
X												
X												
X			X									
				X								
X			X									
	X		X	X	X							
					X							
					X							
X												
X												
	X		X	X								
		X	X									
	X	X	X									

Ammunition and Explosives (cont'd)

Annex A to Appendix D

PERMISSIBLE STOWAGE OF

TYPE OF AMMUNITION	TYPE OF MAGAZINE						
	P R O J E C T I L E S & R O C K E T H E A D S	F I X E D A M M O G U N & R O C K E T R O C K E T	P R O P E L L A N T, T, G U N, B A G T Y P E	P R O P E L L A N T, T, G U N, B A G C A S E D	P R O P E L L A N T, T, G U N, B A G C A S E D	P R O P E L L A N T, T, G U N, B A G C A S E D	F U Z E S L I Q U I D F U E L
Warheads, Rockets, 5.00", Chafe, III	X						
Warheads, Rockets, 2.75" and 5.00", Chemical, WP	X						
Warheads, f/RAP and Rockets, HE Loaded	X						
Warheads, Torpedo, HE Loaded							

1/ See Paragraph 3-57 NAVSEA OP4
 2/ May be stowed, if authorized by COMNAVSEASYS COM, in separate stowage only.
 3/ If not assembled, fuses and charges will be segregated in individual lockers.
 4/ Can be stowed with assembled, service torpedoes on tenders.
 5/ To be stowed above deck in dry jettisonable lockers only.

Figure D-A-1. Permissible Stowage of

Permissible Stowage of Ammunition and Explosives

AMMUNITION AND EXPLOSIVES

TYPE OF MAGAZINE													REMARKS
PYROTECHNIC	CHEMICAL	BOMB TYPE	SMALL ARMS	WARHEADS	MISSILES	GRENADES	DETONATORS	READY SERVICE	DEMOLITION	DEMOLITION MATERIAL	SPECIAL LOCKERS		
X								X					
									X				
										X			
		X	X						X				

Ammunition and Explosives (cont'd)

Annex A to Appendix D

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ANNEX B TO APPENDIX D

AVIATION ORDNANCE TECHNICAL PUBLICATIONS AND INSTRUCTIONS LIBRARY CHECKLIST

1. Instructions:

- Naval Warfare Publication 3-01.4
Helicopter Operating Procedures for Air-Capable Ships.
- OPNAVINST 3120.32 (series)
Standard Organization and Regulations of the US Navy.
- OPNAVINST 5100.19 (series)
Navy Safety Precautions for Forces Afloat.
- OPNAVINST 5102.1 (series)
Mishap Investigation and Reporting.
- OPNAVINST 5530.1 (series)
Department of the Navy Physical Security Instruction for Sensitive Conventional Arms, Ammunition, and Explosives (AA&E).
- OPNAVINST 8600.2 (series)
Naval Airborne Weapons Maintenance Manual.
- NAVSEAINST 8020.6 (series)
Weapon System Explosive Safety Review Program.
- Title 46 Code of Federal Regulations 146.29
Detailed Regulations Governing the Transportation of Military Explosives and Hazardous Munitions Onboard Vessels.
- SPCCINST 8010.12
Supply Management of Ammunition; Policy, Procedures and Responsibilities.
- COMNAVSURFLANTINST 8023.4/COMNAVSURFPACINST 8023.5
Non-Nuclear Ordnance/Explosive Handling Qualification and Certification Program.
- COMNAVSURFLANTINST 9093.3
Commander Naval Surface Force, US Atlantic Fleet Combat System Officers Manual.
- Naval Safety Center Instruction 8020.1
Ship/Submarine Explosives Safety Surveys and Checklist.

Annex B to Appendix D

2. Bills:

- ____ Ships EMCON Bill.
- ____ Ships HERO Bill.
- ____ Ships HERO Survey.

3. Publications:

- ____ General Specifications for Ships, US Navy.
- ____ Naval Ships Technical Manual (S9086-VG-STM-000) Chapter 7.
- ____ NAVSEA S9522-AA-HBK-010
Instruction Book Magazine Sprinkler System.
- ____ NAVSEA OP-4
Ammunition Afloat.
- ____ NAVSEA OP-1014
Ordnance Safety Precautions.
- ____ NAVSEA OP-2165 Volume 1
Navy Transportation Safety Handbook.
- ____ NAVSEA SW060-AA-MMA-010
Demolition Material.
- ____ NAVSEA SW050-AB-MMA-010
Pyrotechnic Screening and Marking Devices.
- ____ NAVSEA OP-2238
Identification of Ammunition.
- ____ NAVSEA SW050-AC-ORD-010/NA-11-15-8
Toxic Hazard Associated with Pyrotechnic Devices.
- ____ NAVSEA OP-3347
US Navy Ordnance Safety Precautions.
- ____ NAVAIR 11-1-116B/TWO010-AA-ORD-030
Naval Ammunition Logistic Codes (NALC).
- ____ NAVAIR 11-1F-2
Fuze Manual, Airborne Bomb and Rocket, Description and Characteristics.

Aviation Ordnance Technical Publications and Instructions Library Checklist

- NAVAIR NA-00-80R-14
Aircraft Firefighting & Rescue Manual.
- NWP 3-04.1M
Helicopter Operating Procedures for Air-Capable Ships.
- NAVAIR 11-85-5
Airborne Rockets.
- NAVAIR 11-75A-61
2.75 Inch Airborne Rocket Launchers (LAU-61, 68 series).
- NAVAIR 11-120A-1.1/1.2
Airborne Weapons Packaging, Handling and Stowage.
- NAVAIR 19-15BC-12
AERO-12C, Bomb Skid.
- NAVAIR 19-600-96-6-4
Calendar Maintenance Requirement Cards Bomb Skid, AERO-12B/C.
- NAVAIR 19-95-1
Airborne Weapons/Stores Manual Checklist, Transportation and Loading Equipment Configuration.
- AW-820YB-MIB-000
HELLFIRE Missile, Fleet Missile Maintenance.
- SW020-AC-SAF010, SW020-AC-SAF-020, and SW020-AC-SAF030
Transportation and Storage Data for Ammunition, Explosives, and Related Hazardous Materials.
- TM 9-1425-429-12
STINGER Missile; Operational Organizational Maintenance Manual.
- TM 9-1005-213-25
.50 Caliber Machine Gun.
- Table D-A-1. PERMISSIBLE STOWAGE OF AMMUNITION AND EXPLOSIVES TM 2.75 FFAR (Folding Fin Aerial Rocket)

Annex B to Appendix D

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ANNEX C TO APPENDIX D

JOINT HELICOPTER HANDLING, QUALIFICATION, AND CERTIFICATION FOR CONVENTIONAL AVIATION ORDNANCE DEVICES

1. Ordnance and Explosive Device Handling

Safe ordnance and explosive device handling requires the attention of all echelons of command. Qualification and certification of aviation personnel in the safe, efficient handling of ordnance and explosive devices should be structured around existing training programs.

2. Qualification Procedures

Qualification of personnel will be as a team member (TM), individual (I), team leader (TL), quality assurance (QA), instructor (IN), and safety observer (SO).

3. Certification

When qualified and recommended for certification, each person will be issued certification by the parent Service.

a. Team Member Qualification and Certification. All personnel whose duties require handling, packaging, unpacking, assembling or disassembling, fuzing, loading, downloading, arming, or de-arming of ordnance and explosive devices will be qualified and certified as team members. This level indicates an in-training status and applies to personnel that must be supervised in the performance of their duties.

b. Individual Qualification and Certification. Personnel whose duties require that they individually inspect (including acting as safety observers), prepare, adjust, arm, or de-arm ordnance and explosive devices will be qualified and certified for such

tasks. Personnel conducting magazine inspections, maintenance on aircraft, safety, and survival equipment, or performing any function that involves ordnance and explosive devices will be included in this program. Supervisors of ordnance and explosive device operations will be individually certified for evolutions that they may supervise or observe.

c. Team Leader Qualification and Certification. Personnel who have been previously qualified and certified to the I level whose duties require that they direct and supervise others in safe and reliable operations may be designated as TL.

d. Quality Assurance Qualification and Certification. QA qualification and certification will be certified to the I or TL level and have detailed knowledge of applicable ordnance and explosive devices or systems inspection criteria to determine that the device or system will function properly. In addition, personnel must be able to determine that the necessary assembly or installation procedures have been completed using applicable directives. Personnel who are QA representatives or collateral duty QA representatives and perform functions involving explosive devices will also be qualified and certified as a minimum to QA level and as SOs as outlined in the following paragraph.

e. Safety Observer Qualification and Certification. The qualification and certification standards of the SO will ensure that the member has sufficient knowledge of applicable safety procedures, equipment, and devices under observation to be able to recognize and react to violations.

Annex C to Appendix D

f. Instructor Qualification and Certification. To obtain an IN qualification and certification, personnel will be qualified and certified as I or TL and have developed the necessary skills to instruct others using a command-approved course of instruction.

g. Duration and Revocation. The expiration date and cause for revocation will be determined by the parent Service of the embarked detachment.

4. Explosive Devices

Each type of explosive device will be considered as a separate family. The following list of types of explosive devices is considered representative, but not all inclusive:

- a. High-explosive bombs and components.
- b. Cluster bomb units.
- c. Special-purpose bombs (practice bombs with marker charges, leaflet chaff).
- d. Pyrotechnics.
- e. Chemical ammunition.
- f. Underwater sound signals.
- g. Demolition explosive and material.
- h. Mines and components.
- i. Cartridges and cartridge-actuated devices.
- j. Rocket warheads and components.
- k. Small arms and landing force ammunition.
- l. Aircraft gun ammunition.
- m. Air-launched guided missiles and components.

- n. Targets and components.
- o. Aircrew escape propulsion systems (AEPS).
- p. Guided weapons (LGB, WALLEYE).
- q. Destruitors.

5. Explosive Operations

Each type of explosive operation will be considered as a separate family. The following list of explosive operations is considered representative but not all inclusive:

- a. **Ashore Operations**
 - Receipt, segregation, storage, and issue functions.
 - Aircraft arming and de-arming.
- b. **Afloat Operations**
 - Aircraft release and control system checks.
 - Aircraft loading and downloading.
 - Aircraft arming and de-arming.
 - Installation or removal of AEPS or cartridge-actuated devices.
 - Ordnance and explosive device handling and transporting.
 - Ordnance and explosive device unpackaging and packaging.
 - Ordnance and explosive device inspection, assembly, or disassembly.
 - Aircraft gun handling, loading, or jam clearing.
 - Storage.

Joint Helicopter Handling, Qualification,
and Certification for Conventional Aviation Ordnance Devices

6. Record of Certification

Documentation of certification will be accomplished using Figure D-C-1. The following notes will be used in its preparation.

Annex C to Appendix D

**JOINT SHIPBOARD HELICOPTER OPERATIONS
MANUAL CONVENTIONAL AVIATION ORDNANCE DEVICES
CERTIFICATION/QUALIFICATION SHEET**

CERTIFICATION LEVELS

TM TEAM MEMBER TL TEAM LEADER SO SAFETY OBSERVER
I INDIVIDUAL QA QUALITY ASSURANCE IN INSTRUCTOR

WORK TASK CODES

- | | | |
|-----------------------------|---------------------------|---------------------|
| 1. STORAGE/STOWAGE | 5. ARM/DE-ARM | 9. AIRCRAFT RELEASE |
| 2. HANDLING | 6. TRANSPORTING | & CONTROL |
| 3. ASSEMBLY/
DISASSEMBLY | 7. MAGAZINE
INSPECTION | |
| 4. LOAD/DOWNLOAD | 8. INSTALL/REMOVE | |

EXPLOSIVE WORK CERT INDIVIDUAL APPROVAL DATE
DEVICE TASK FORCE LEVEL SIGNATURE AUTHORITY CERT

CERTIFICATIONS ABOVE HAVE BEEN REVIEWED AND RECERTIFIED AS PER DATES AND SIGNATURE INDICATED BELOW. EFFECTIVE FOR ____ MONTHS (NOTE: ITEMS NOT REQUIRED FOR RECERTIFICATION WILL BE LINED OUT.).

INDIVIDUAL BEING CERTIFIED APPROVAL AUTHORITY

SIGNATURE DATE SIGNATURE DATE

SIGNATURE DATE SIGNATURE DATE

SIGNATURE DATE SIGNATURE DATE

NAME GRADE SSN/MOS ACTIVITY

Figure D-C-1. Joint Shipboard Helicopter Operations Manual Conventional Aviation Ordnance Devices Certification/Qualification Sheet

Joint Helicopter Handling, Qualification, and Certification for Conventional Aviation Ordnance Devices

Notes:

The following list of definitions and guidelines is provided to assist in preparation of the record of certification.

- a. Explosive Device. Applicable explosive device for which the person is being certified.
- b. Individual Signature. Signature of person being certified. Signing acknowledges certification level and work task code for the explosive device or family; therefore, a signature is required for each line entry.
- c. Conventional Ordnance Handling and Certification Board Chairman Signature. Signature of the commanding officer, officer in charge, or department head designated to act as board chairman.
- d. Date Certified. Date certification is effective.
- e. Recertification. Recertification or acceptance of certification from other commands may be accomplished using the space provided. Once the individual has been recertified or accepted and the board chairman signs and dates the form, the certification duration will be determined by the parent Service.
- f. Corrections. The use of whiteout or correction tape or a single line through the entire entry and signature by the individual and board chairman for revocation of certification for cause.
- g. Delays. Normally, certification will occur within 30 days of the demonstrated proficiency dates.
- h. Family Groups. Family groups are explosive devices with similar characteristics as represented in paragraph 4.
- i. Certification Levels. List the highest certification level applicable. TM, I, TL, and QA are interrelated. For example, an individual certified to the QA level is also qualified and certified to perform as a TM, I, or TL.

Annex C to Appendix D

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ANNEX D TO APPENDIX D
WEAPONS LOADING, STRIKEDOWN, DOWNLOADING,
AND RECOVERY

Annex D to Appendix D

WEAPONS LOADING, STRIKEDOWN, DOWNLOADING, AND RECOVERY GUIDE				
WEAPON	HANGAR		RECOVERY 1/	
WEAPON	LOAD	STRIKEDOWN DOWNLOAD	UNEXPENDED	HUNG
GENERAL PURPOSE BOMBS	YES 2/ 3/	YES 4/	YES 5/	YES 5/
DST	YES 3/	YES 4/	YES 5/	YES 5/
CBU-55 FAE	NO	NO	NO	NO
2.75 INCH ROCKETS	NO	NO 6/	YES	YES
5.0 INCH ROCKETS	NO	NO 6/	YES	YES
A/C PARACHUTE FLARE (MK-45)	NO	NO	YES	YES
A/C PARACHUTE FLARE (LUU-2B/B)	YES 7/	YES 7/	YES 7/	YES 7/
FLARE DISPENSER (LOADED WITH MK-45)	NO	NO	YES	YES
FLARE DISPENSER (LOADED WITH LUU-2B/B)	YES 7/	YES 7/	YES 7/	YES 7/
20MM GUNS/GPU-2A	YES	YES 8/ 9/	YES	YES
SIDEWINDER MISSILES	NO 10/	YES	YES	YES
MAVERICK	NO 10/	YES	YES	YES
MK-46 DECOY FLARES	NO	NO	YES	YES
TORPEDOES (ALL)	YES 3/	YES 4/	YES	YES
SUS CHARGE (MK-46)	YES	YES	YES	YES
SIDEARM MISSILES	NO 4/	YES	YES	YES
MARINE MARKER	YES	YES	YES	YES
PRACTICE BOMBS	YES 5/	YES 6/	YES	YES
JAU-1B/JAU-22/B	YES	YES 11/	YES	YES
CARTRIDGE TOW MISSILES	NO 4/	YES	YES	YES
AN/ALE-X DISPENSER	YES	YES	YES	YES
AIR SHAFT CARTRIDGE	NO	NO	YES	YES
HELLFIRE MISSILES	NO	YES	YES	YES
.50-CAL MACHINE GUN	NO	NO	YES	YES

Figure D-D-1. Weapons Loading, Strikedown, Downloading, and Recovery Guide

Weapons Loading, Strikedown, Downloading, and Recovery

WEAPONS LOADING, STRIKEDOWN, DOWNLOADING, AND RECOVERY GUIDE				
WEAPON	HANGAR		RECOVERY 1/	
WEAPON	LOAD	STRIKEDOWN DOWNLOAD	UNEXPENDED	HUNG
STINGER MISSILES	NO4/	YES	YES	YES
7.62MM GUNS	NO	NO	YES	YES
M118 GRENADE LAUNCHER	NO	NO	YES	YES

Notes:

1/ Guidance provided in this Annex is subject to individual tactical manual limitations.
2/ No mechanical nose fuzes will be installed on the hangar deck.
3/ Ejector cartridges will not be installed on the hangar.
4/ In the event of strikedown of a loaded aircraft to the hangar, the nose fuzes (as applicable) and ejector and jettison cartridges will be removed immediately after the aircraft is in spot and tied down.
5/ Arming wires and safety clips intact.
6/ LHAs with centerline elevators may lower aircraft to the hangar deck only if downloading on the flight deck will delay the launch. Hangar deck downloading will be performed immediately after the aircraft is in the spot and tied down.
7/ Impulse cartridges must be removed from dispensers loaded with LUU-2B/B parachute flares.
8/ The GPU-s gun pod is exempt from downloading requirements for up aircraft temporarily spotted in the hangar and aircraft undergoing limited maintenance, e.g., turnaround maintenance, providing compliance with all gun de-arm procedures has been accomplished.
9/ Strikedown or download of aircraft with jammed 20mm gun pods is prohibited.
10/ Air-launched missiles will not normally be loaded on the hangar deck except when operational commitments so dictate. Commanding officers may authorize loading of missiles on the hangar only up to the point of mechanical attachment of the weapon to the launcher or rack in accordance with the procedures prescribed in the appropriate Loading Checklists.
11/ Normally, maintenance will not be conducted on aircraft loaded with weapons; however, routine servicing and minor maintenance that would ready the aircraft for the next launch may be conducted after all weapons are safed to the maximum degree possible.

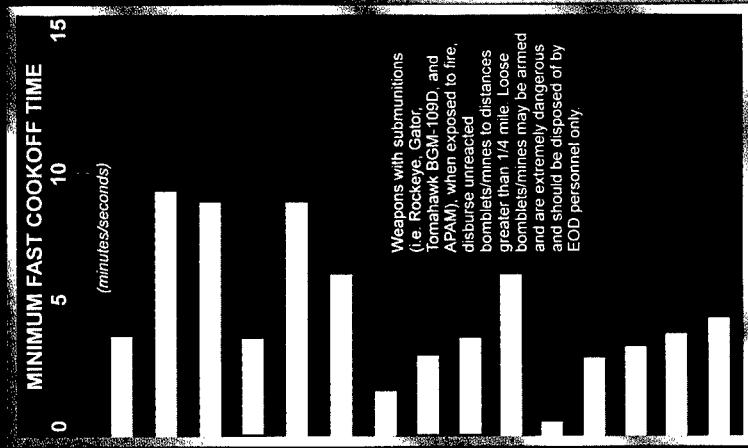
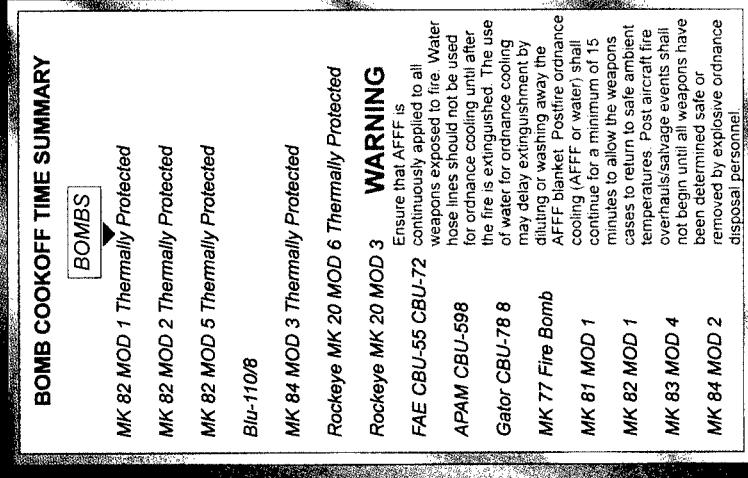
Figure D-D-1. Weapons Loading, Strikedown, Downloading, and Recovery Guide (cont'd)

Annex D to Appendix D

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ANNEX E TO APPENDIX D
MUNITIONS COOKOFF TIME SUMMARY

BOMB COOKOFF TIME SUMMARY



REMARKS

Firefighting Hazard

Time	Reaction	REMARKS
3:33		Major after 4:00 minutes
8:52		Major after 10:00 minutes
8:49		Major after 9:00 minutes
3:00		Major after 3:00 minutes
8:45		Major after 9:00 minutes
6:15		Major after 6:00 minutes
1:13		Major after 1:00 minutes
2:00		Major after 2:00 minutes
2:30		Major after 1:00 minutes
6:32		Major after 6:00 minutes
0:30		Major after 5:00 minutes
1:50		Major after 2:00 minutes
2:04		Major after 2:00 minutes
2:32		Major after 2:00 minutes
3:02		Major after 2:00 minutes

Figure D-E-1. Bomb Cookoff Time Summary

AIR-LAUNCHED MISSILE COOKOFF TIME SUMMARY

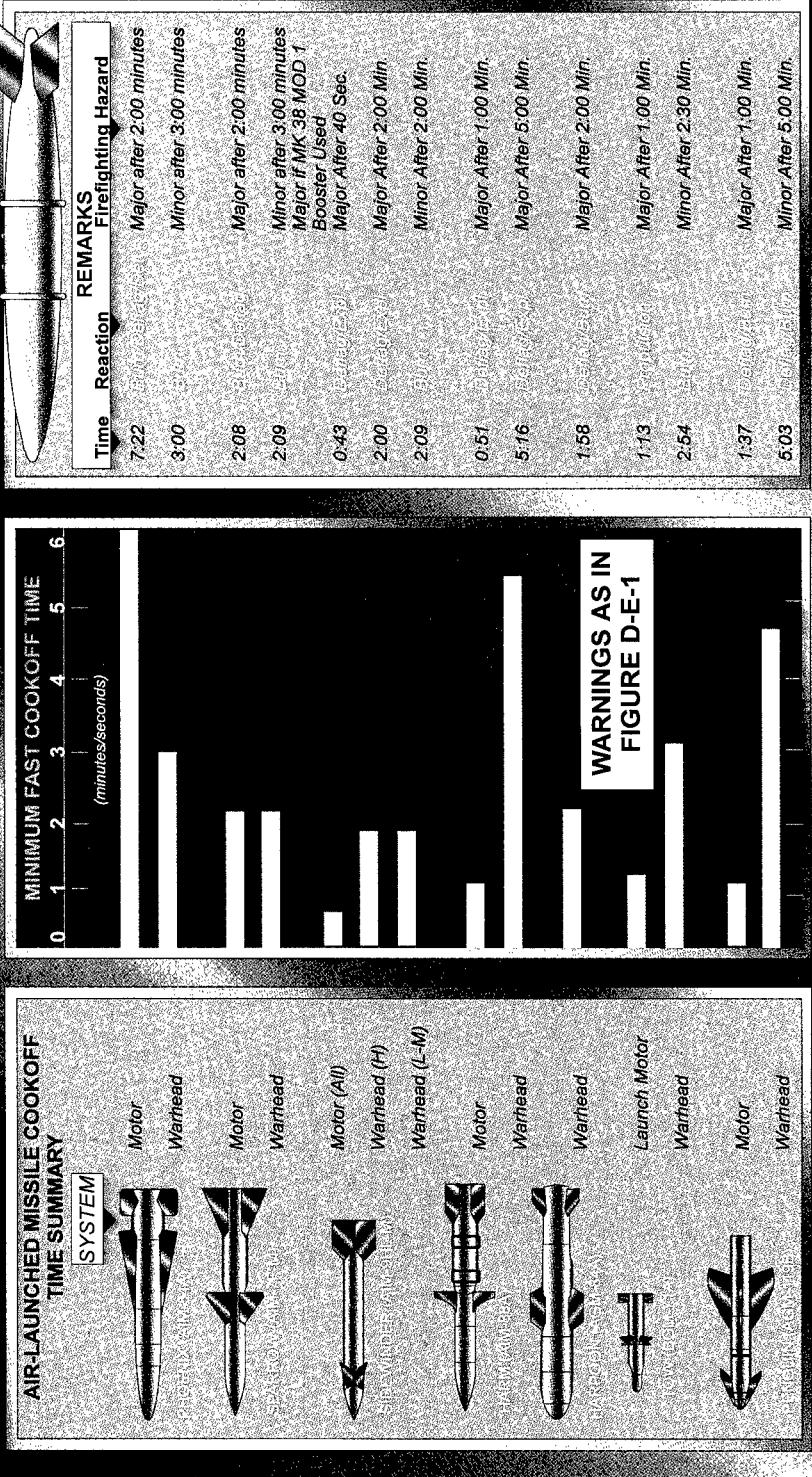


Figure D-E-2. Air-Launched Missile Cookoff Time Summary

Annex E to Appendix D

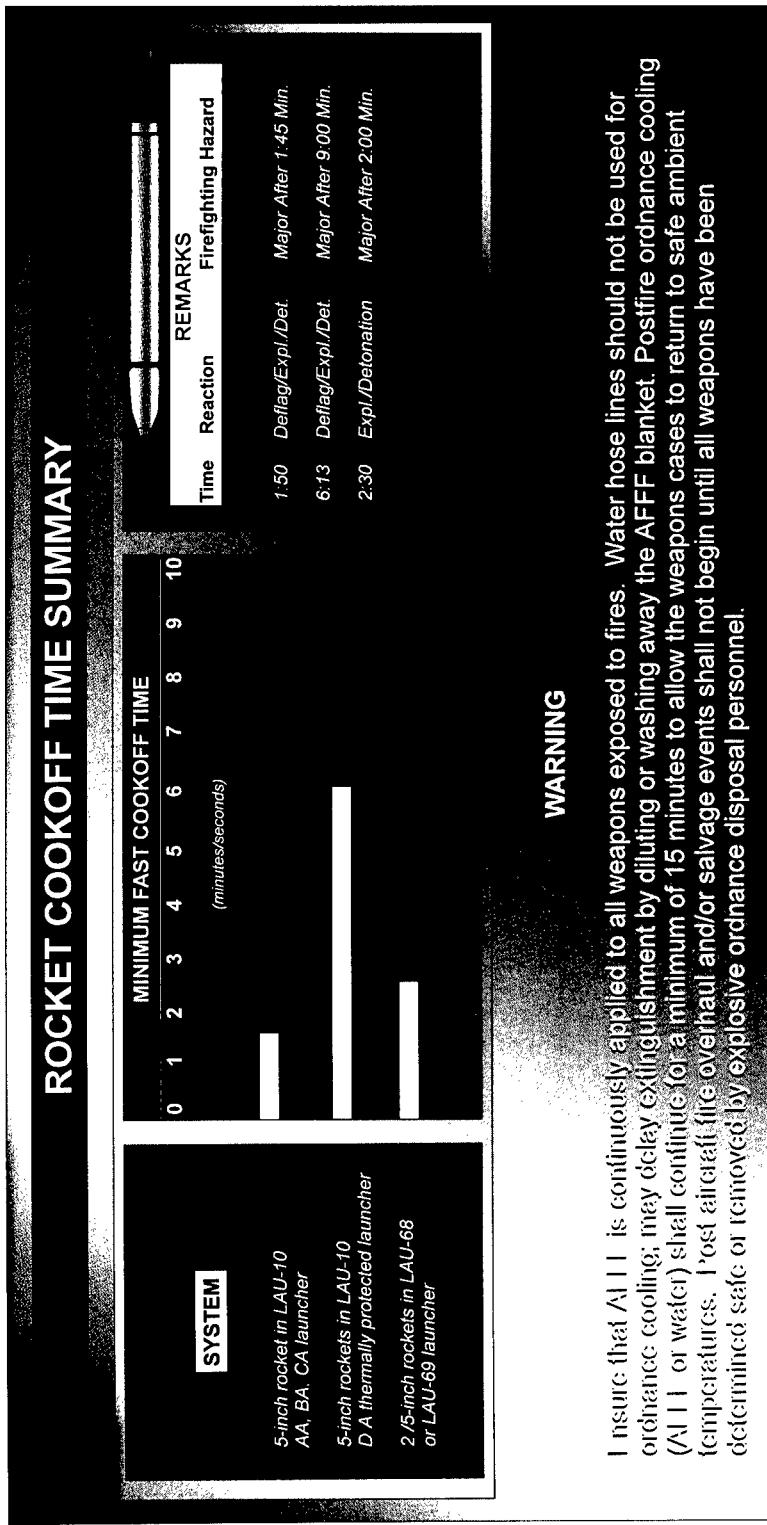


Figure D-E-3. Rocket Cookoff Time Summary

ANNEX F TO APPENDIX D

HELICOPTER WEAPONS CONFIGURATION - BY SERVICE

US MARINE CORPS	
WEAPON	AIRCRAFT
TOW MISSILES	AH-1W
HELLFIRE MISSILES	AH-1W
SIDEWINDER MISSILES	AH-1W
SIDEARM MISSILES	PRELIMINARY AH-1W
2.75-INCH ROCKETS	AH-1W/UH-1N
5.00-INCH ROCKETS	AH-1W
SUU-25F/A FLARE DISPENSER	AH-1W
SUU-44/A FLARE DISPENSER	AH-1W
PRACTICE BOMBS (MK-76, BDU-33, MK-106, BDU-48)	AH-1W
M197 20MM TURRET	AH-1W
ALE-39 CHAFF/DECOY FLARE DISPENSER	AH-1W/UH-1N/ CH-46/CH-53
GAU-17 7.62MM MINI-GUN	UH-1N
M60 7.62MM MACHINE GUN	UH-1N
GAU-16 .50-CAL MACHINE GUN	UH-1N
XM-218 .50-CAL MACHINE GUN	CH-46/CH-53/UH-1N

Figure D-F-1. US Marine Corps Helicopter Weapons Configuration

Annex F to Appendix D

US ARMY	
WEAPON	AIRCRAFT
M-130 FLARE/CHAFF	AH-1/AH-64/CH-47/EH-60/ UH-1/UH-60/ MH-60L/H (USA-SOF) MH-47D/E (USA-SOF)
M-60 7.62 MACHINE GUN	UH-1/UH-60/CH-47
STINGER MISSILES	AH-1/AH-64/CH-47/ MH-60L(DAP) (USA-SOF)/ UH-60/OH-58C/OH-58D
2.75-INCH ROCKETS	OH-58D/AH-1/AH-64/AH-6/ MH-60L(DAP) (USA SOF)
HELLFIRE MISSILES	OH-58D/AH-64/AH-6/ MH-60L(DAP) (USA SOF)
.50-CAL MACHINE GUN	OH-58D/AH-6/ MH-60L(DAP) (USA SOF)
TOW MISSILES	AH-1
7.62 TURRET	AH-1S
20MM TURRET	AH-1E/AH-1F
40MM GRENADE LAUNCHER	AH-1
30MM RAPID FIRE CHAIN GUN	AH-64/ MH-60(DAP) (USA-SOF)
7.62 MINI GUN	AH-6/MH-60 A/L MH-60K (USA-SOF) MH-47D/E (USA-SOF)

Figure D-F-2. US Army Helicopter Weapons Configuration

Helicopter Weapons Configuration — By Service

US AIR FORCE	
WEAPON	AIRCRAFT
M-60 7.62 MACHINE GUN	M/HH-60G (USAF-RESCUE & SOF)
M-130 FLARE DISPENSER	M/HH-60G (USAF-RESCUE & SOF)
2.75-INCH ROCKETS	HH-60G (USAF-RESCUE & SOF)
.50-CAL MACHINE GUN	MH-53J (USAF-SOF) MH-60G (USAF-SOF)
7.62 MINI GUN (GUA-2B)	MH-53J (USAF-SOF) M/HH-60G (USAF-RESCUE & SOF)
AN/ALE-40 DECOY CHAFF/FLARE DISPENSER	HH-60G (USAF-RESCUE & SOF) MH-53J (USAF-SOF)

Figure D-F-3. US Air Force Helicopter Weapons Configuration

US NAVY	
WEAPON	AIRCRAFT
M60 7.62MM MACHINE GUN	HH-60/SH-60B/MH-53/ SH-2/SH-3/UH-1N/H-46D
.50-CAL MACHINE GUN	MH-53/UH-1N
ALE-39 CHAFF/DECOY FLARE DISPENSER	HH-60/SH-60B/MH-53/ SH-2/SH-3
M-130 FLARE/CHAFF	HH-60/SH-60B/MH-53/ SH-2/SH-3
MK-46/50	SH-60B/SH-60F/SH-2/SH-3
2.76 ROCKETS	UH-1N
HELLFIRE MISSILES (AGM-114)	SH-60B/HH-60H
PENGUIN MISSILES (AGM-119)	SH-60B
50 Cal. (GAU 16)	SH-60B/HH-60H

Figure D-F-4. US Navy Helicopter Weapons Configuration

Annex F to Appendix D

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APPENDIX E

FLIGHT DECK CLOTHING COLOR CODING

PERSONNEL	HELMET 1/	JERSEY	SYMBOLS 2/
Aircraft Handling Crew and Chockmen	Blue	Blue	Crew Number
Aircraft Handling Officers, CPO, LPO	Yellow	Yellow	Billet Title
Elevator Operators	White	Blue	E
LSE (Crew Directors)	Yellow	Yellow	Crew Number
Maintenance Crews	Green	Green	Black Stripe and Squadron Designator
Medical	White	White	Red Cross
Messengers and Telephone Talkers	White	Blue	T
Photographers	Green	Green	P
Plane Captains	Brown	Brown	Squadron Designator
Ordnance	Red	Red	Black Stripe and Squadron Designator/ ship's billet title
Crash and Salvage Crews	Red	Red	Crash/Salvage
Tractor Driver	Blue	Blue	Tractor
Maintenance Crews	Green	Green	Black Stripe broken by abbreviation of specialty (that is, P/P (Power Plants))
Aviation Fuel Crew	Purple	Purple	F
Aviation Fuel Officer	Purple	Purple	Fuel Officer
Combat Cargo	White	White	Combat Cargo
Safety Observer	White	White	Green Cross

1/ Combination cranial.

2/ USCG flight deck clothing does not include symbols.

Figure E-1. Flight Deck Clothing Color Coding

Appendix E

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APPENDIX F

AIRCRAFT HANDLING SIGNALS

WARNING

This appendix contains information that may change without notice through the joint publication system. If a conflict exists with more specific procedures, those specific procedures will have precedence.

Appendix F

AIRCRAFT HANDLING SIGNALS			
SIGNAL	DAY	NIGHT	REMARKS
	Hand raised, thumb up.	Same as day, except with wands	Conforms to International Civil Aviation Organization signal
	Arms held out, hand below waist level, thumb turned downward.	Same as day, except with wands	
	Right or left arm down, other arm moved across the body and extended to indicate direction to next marshaler	Same as day, except with wands	Conforms to International Civil Aviation Organization signal
	Arms above head in vertical position with palms facing inward	Same as day, except with wands	Conforms to International Civil Aviation Organization signal
	Arms down with palms toward ground, then moved up and down several times	Same as day, except with wands	Conforms to International Civil Aviation Organization signal

Figure F-1. Aircraft Handling Signals

Aircraft Handling Signals

SIGNAL	DAY	NIGHT	REMARKS
	Point right arm downward, left arm is repeatedly moved upward and backward. Speed of arm movement indicates rate of turn	Same as day, except with wands	Also used for spot turn for airborne aircraft. Conforms to International Civil Aviation Organization signal
	Point left arm downward, right hand repeatedly moved upward and backward. Speed of arm movement indicates rate of turn	Same as day, except with wands	Also used for spot turn for airborne aircraft. Conforms to International Civil Aviation Organization signal
	Arms extended from body and held horizontal to shoulders with hands upraised and above eye level, palms facing backward. Execute beckoning arm motion angled backward. Rapidity indicates speed desired of aircraft	Same as day, except with wands	Conforms to International Civil Aviation Organization signal
	Arms crossed above the head, palms facing forward	Same as day, except with wands	Signal is Mandatory
	"ON" - Arms above head, open palms and fingers raised with palms toward aircraft, then fist closed. "OFF" - Reverse of above	"ON" - Arms above head then wands crossed "OFF" - Crossed wands, then uncrossed	

Figure F-1. Aircraft Handling Signals (cont'd)

Appendix F

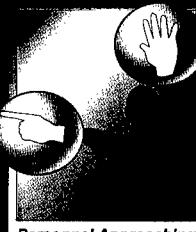
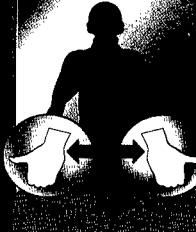
SIGNAL	DAY	NIGHT	REMARKS
	Left hand raised vertically overhead, palm toward aircraft. The other hand indicates to personnel concerned and gestures toward aircraft	Same as day, except with wands	
	Arms down, fists closed, thumbs extended inward, swing arms from extended position inward	Same as day, except with wands	Conforms to International Civil Aviation Organization signal
	Arms down, fists closed, thumbs extended outward, swing arms outward	Same as day, except with wands	Conforms to International Civil Aviation Organization signal
	With arms above head, the right hand clasps left forearm and the left fist is clenched	Similar to the day signal except the right wand is placed against left forearm. The wand in the left hand is held vertical	
	With arms and hands in "INSTALL DOWN LOCKS" position, the right hand unclasps the left forearm	Similar to day, except with wands	

Figure F-1. Aircraft Handling Signals (cont'd)

Aircraft Handling Signals

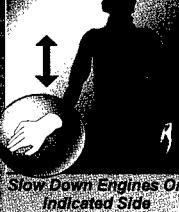
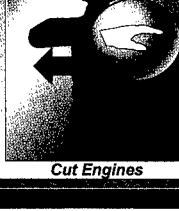
SIGNAL	DAY	NIGHT	REMARKS
	Hands above head, left fist partially clenched, right hand moved in direction of left hand with first two fingers (one finger for SINS) extended and inserted into circle made by fingers of the left hand	Same as day, except with wands	
	Hands above head, left fist partially clenched, right hand moved away from left hand withdrawing first two fingers (one finger for SINS) from circle made by fingers of the left hand	Same as day, except with wands	
	Left hand overhead with appropriate number of fingers extended, to indicate the number of the engine to be started, and circular motion of right hand at head level	Similar to day, except that the wand in the left hand will be flashed to indicate the engine to be started	Conforms to International Civil Aviation Organization signal
	Arms down with palms toward ground, then either right or left arm waved up and down indicating that left or right side engines, respectively should be slowed down	Same as day, except with wands	Conforms to International Civil Aviation Organization signal
	Either arm and hand level with shoulder, hand moving across throat, palm downward. The hand is moved sideways with the arm remaining bent	Same as day, except with wands	Conforms to International Civil Aviation Organization signal

Figure F-1. Aircraft Handling Signals (cont'd)

Appendix F

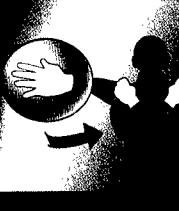
AIRCRAFT HANDLING SIGNALS			
SIGNAL	DAY	NIGHT	REMARKS
	Hands together overhead, opened from the wrists in a "V", then closed suddenly	Same as day, except with wands	
	Hands overhead, palms together, then hands opened from the wrists to form a "V", wrists remaining together	Same as day, except with wands	
	Arms straight out at sides, then swept forward and hugged around shoulders	Same as day, except with wands	
	Arms hugged around shoulders, then swept straight out to the sides	Same as day, except with wands	
	Hit right elbow with palm of left hand	Similar to day, except with wands	
Lock Tail Wheel			
Turn Left			
Turn Right			
Spread Wings/Helicopter Blades			
Lock Wings/Helicopter Blades			

Figure F-1. Aircraft Handling Signals (cont'd)

Aircraft Handling Signals

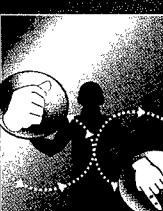
SIGNAL	DAY	NIGHT	REMARKS
	Body bent forward at the waist, hands held with fingertips touching in front of body and elbows bent at approximately 45 degrees, then arms swing downward and outward	Same as day, except with wands	
	Body bent forward at the waist and arms extended horizontally, then arms swing downward and in until fingertips touch in front of the body with elbows bent at approximately 45 degrees	Same as day, except with wands	
	Director conceals left hand and makes circular motion of right hand over head in horizontal plane ending in a throwing motion of arm toward direction of takeoff	Same as day, except with wands	
	Describes a large figure eight with one hand and points to fire area with the other hand	Same as day, except with wands	Signal is meant for information only. Pilot should be given a "CUT ENGINE" or continuous "TURNUP" signal, as appropriate
	Point to nose with index finger while indicating direction of turn with other index finger	Same as day, except with wands	

Figure F-1. Aircraft Handling Signals (cont'd)

Appendix F

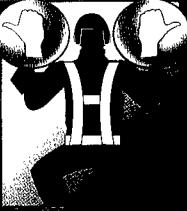
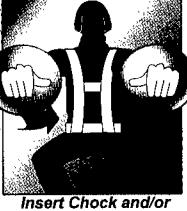
SIGNAL	DAY	NIGHT	REMARKS
	Point to nose with index finger, lateral wave with open palm of other hand at shoulder height	Same as day, except with wands	
	Hold nose with left hand, right hand moving horizontally at waist level. a. Affirmative signal immediately following means: MAN IS TENDING BAR b. A negative signal immediately following means: NO ONE IS TENDING BAR	Same as day, except with wands	
	Swings arms apart, thumbs extended outward	Using hand held light or flashlight, gives on/off signals at one second intervals	
	To tiedown crew: Makes wiping motion down left arm with right hand	Same as day, except with wands	
	Swings arms together, thumbs extended inward. In single piloted aircraft, pilot may swing one arm alternately from each side, thumb extended inward	Moves hand held light or flashlight at eye level in a horizontal plane alternately inward from each side	

Figure F-1. Aircraft Handling Signals (cont'd)

Aircraft Handling Signals

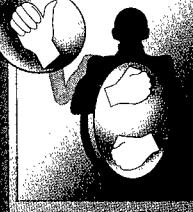
SIGNAL	DAY	NIGHT	REMARKS
	To tiedown crew: Rotates hands in a circle perpendicular to and in front of his body	Same as day, except with wands	
	Same signal as "INSTALL TIEDOWNS", followed by "thumbs up"	Same as day, except with wands	
	Moves forefinger in a circular motion in view of director to indicate that he is ready to run up engines	Makes circular motion with hand-held light	Director responds with same signal (wand at night) to indicate "clear to run up"
	Makes rapid fanning motion with one hand in front of face and points to wheel with other hand	Same as day, except with wands	
	Points to eyes with two fingers to signal "lights on"	Flashing wands	When lights are already on, same signal is used to signal "lights off."

Figure F-1. Aircraft Handling Signals (cont'd)

Appendix F

SIGNAL	DAY	NIGHT	REMARKS
	Hold one hand open, motionless and high above head, with palm forward	Same as day, except with wands	
	Points to power unit exhaust with left hand index finger; moves right hand in horizontal circle, index and middle finger pointing downward.	Same as day, except with wands	
	Makes "throat cutting" action with left hand; moves right hand in horizontal circle, index and middle fingers pointing downward	Same as day, except with wands	
	Extend arms sideways from body and parallel to deck; then move them up and down	Same as day, except with wands	
	Left arm raised above shoulder with number of fingers extended to indicate affected engine; right hand describes pendulum motion between waist and knees	Similar to day signal except that wand in left hand will be flashed to indicate the number of the affected engine	Signal is for information only; pilot should be given "CUT ENGINE" or continuous "TURNUP" signal as appropriate
<i>I Have Command</i>			
<i>Start Up</i>			
<i>Need EOD Personnel</i>			
<i>Fuel Discharge During Start</i>			

Figure F-1. Aircraft Handling Signals (cont'd)

Aircraft Handling Signals

AIRCRAFT HANDLING SIGNALS

SIGNAL	DAY	NIGHT	REMARKS
	Marshaler stands with arms raised vertically above head and facing toward the point where the aircraft is to land. The arms are lowered repeatedly from a vertical to a horizontal position, stopping finally in the horizontal position	Same as day, except with wands	
	Arms extended horizontally sideways beckoning upwards, with palms turned up. Speed of movement indicates rate of ascent	Same as day, except with wands	Conforms to International Civil Aviation Organization signal
	Arms extended horizontally sideways, palms downward	Same as day except with wands	Conforms to International Civil Aviation Organization signal
	Arms extended horizontally sideways beckoning downwards, with palms turned down. Speed of movement indicates rate of descent	Same as day, except with wands	Conforms to International Civil Aviation Organization signal
	Right arm extended horizontally sideways in direction of movement and other arm swung over the head in same direction, in a repeating movement	Same as day, except with wands	

Figure F-1. Aircraft Handling Signals (cont'd)

Appendix F

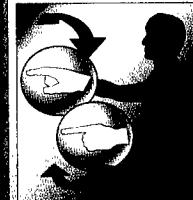
SIGNAL	DAY	NIGHT	REMARKS
	Left arm extended horizontally sideways in direction of movement and other arm swung over the head in same direction, in a repeating movement	Same as day, except with wands	
			<i>Move to Right</i>
	When aircraft approaches director with landing gear retracted, marshaler gives signal by side view of a cranking circular motion of the hands	Same as day, except with wands	
			<i>Lower Gear</i>
	Waving of arms over the head	Same as day except with wands	Signal is Mandatory
	Arms crossed and extended downwards in front of the body	Same as day, except with wands	Conforms to International Civil Aviation Organization signal
			<i>Land</i>
	When rotor starts to "run down" marshaler stands with both hands raised above head, fists closed, thumbs pointing out	Same as day, except with wands	
			<i>Droop Stops Out</i>

Figure F-1. Aircraft Handling Signals (cont'd)

Aircraft Handling Signals

SIGNAL	DAY	NIGHT	REMARKS
	When droop stops go in, marshaller turns thumbs inward	Same as day, except with wands	
	Left hand above head, right hand pointing to individual boots for removal	Same as day, except with wands	
	Circular motion in horizontal plane with right hand above head	Same as day, except with wands	
	Rope climbing motion with hands	Same as day, except with wands	
	Left arm extended forward horizontally, fist clenched, right hand making horizontal slicing movement below the left fist, palm downward	Same as day, except with wands	
Droop Stops In			
Remove Boots			
Hook Up Load			
Release Load			

Figure F-1. Aircraft Handling Signals (cont'd)

SIGNAL	DAY	NIGHT	REMARKS
	Bend left arm horizontally across chest with fist clenched, palm downward; open right hand pointed up vertically to center of left fist	Same as day, except with wands	
	Left arm horizontal in front of body, fist clenched, right hand with palm turned upwards making upward motion	Same as day, except with wands	
	Left arm horizontal in front of body, fist clenched, right hand with palm turned downwards making downward motion	Same as day, except with wands	
	A signal similar to "RELEASE LOAD" except that the right hand has the palm downward and not clenched. Rapid repetition of right hand movement indicates urgency	Same as day, except with wands	
	Bend elbow across chest, palm downward. Extend arm outward to horizontal position, keeping palm open and facing down	Same as day, except with wands	

Figure F-1. Aircraft Handling Signals (cont'd)

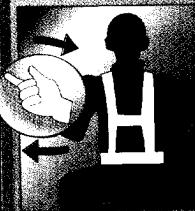
SIGNAL	DAY	NIGHT	REMARKS
	Extend right arm horizontally, palm downward. Bend arm keeping palm down	Same as day, except with wands	
	Helicopter crewmember brings thumb to mouth as if drinking from a glass	Same as day, except use RED lens flashlight	
	Helicopter crewmember makes circular motion with right hand	Helicopter crewmember makes circular motion with RED lens flashlight	
	Ship's fuel crewmember holds GREEN device vertically over RED device	Ship's fuel crewmember holds GREEN wand vertically over RED wand	
	Helicopter crewmember makes horizontal cutting motion of right hand across throat	Helicopter crewmember makes horizontal motion with RED lens flashlight	

Figure F-1. Aircraft Handling Signals (cont'd)

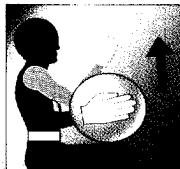
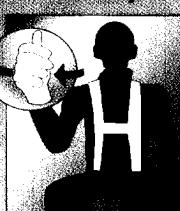
SIGNAL	DAY	NIGHT	REMARKS
	Ship's fuel crewmember holds RED device over GREEN device	Ship's fuel crewmember hold RED wand vertically over GREEN wand	
	Helicopter crewmember makes vertical motion of hand	Helicopter crewmember makes vertical motion with RED lens flashlight	
	Landing signal enlisted/Director makes "WAVE OFF" signal	Landing signal enlisted/Director makes "WAVE OFF" signal with wands	Signal is mandatory
	Moves hand in a circle perpendicular to the deck; follows with a "thumbs up" signal. Signify by number of fingers engine to be started	Turns on flashlight or movable light and moves it in a circle perpendicular to the deck	The air officer shall signal authority to start engines by illuminating a RED rotating beacon
	Moves hand in horizontal circle at eye level, index finger extended. Aircraft lights "flashing bright."	Same as day except holds RED light in hand. Aircraft lights "flashing dim."	At night, aircraft lights should be on "flashing dim" until aircraft is declared up and ready for takeoff by the pilot

Figure F-1. Aircraft Handling Signals (cont'd)

Aircraft Handling Signals

SIGNAL	DAY	NIGHT	REMARKS
	Faces Pri-Fly: Holds left fist above head; gives circular motion of right hand above head, index finger extended	Rotates one wand at chest level; holds other wand above head	The air officer shall signal authority to engage rotors by illuminating a YELLOW rotating beacon
	Gives "thumbs up" signal at eye level. Aircraft lights "steady bright."	Places running and formation lights on "steady dim." May give "thumbs up" signal by turning on flashlight or other moveable lights and moving it up and down	
	Faces Pri-Fly: Holds right thumb up at eye level; holds left fist at eye level	Signal not required. Pilot's "steady dim" indicates readiness to Pri-Fly	The air officer shall signal authority for launch of helicopters by illuminating a GREEN rotating beacon
	To tiedown crew: Makes wiping motion down left arm with right hand	Same as day, except holds AMBER wands	
	Stands in full view of pilot and LSE and holds tiedown and chocks extended to side	Same as day, except illuminates tiedown with AMBER flashlight	

Figure F-1. Aircraft Handling Signals (cont'd)

Appendix F

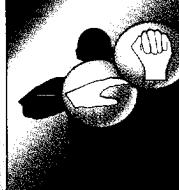
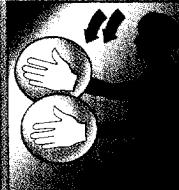
SIGNAL	DAY	NIGHT	REMARKS
	To tiedown crew: Rotates hands in a circle perpendicular to and in front of his body	Same as day, except with AMBER wands	Give "HOLD" signal as soon as first tiedown is attached
	Holds left fist above head, makes throat cutting action with right hand	Same as day, except with AMBER wands	Give "HOLD" signal as soon as first tiedown is attached. The air officer shall signal authority to disengage rotors by illuminating a YELLOW rotating beacon
	Arms extended, makes short up and down chopping action, alternating hands	Same as day, except with AMBER wands	
	Use standard fixed-wing aircraft turn signal, pointing with hand to wheel to be pivoted and giving "come-on" with other hand	Same as day, except with AMBER wands	
	Makes clenched fists at eye level	Hold crossed wands (any color) overhead	Signal is mandatory

Figure F-1. Aircraft Handling Signals (cont'd)

SIGNAL	FROM	TO	EXECUTION
	Director	Pilot	Day: Touch end of nose with forefinger. Then give "thumbs up" signal with same hand. Night: Touch end of nose with wand. Then give "up" signal with same wand
	Director	Pilot	Day: Touch end of nose with forefinger. Then, sweep arm downward in direction of aircraft movement Night: Touch end of nose with wand. Then, sweep wand downward in direction of aircraft movement
	Director	Deck Crew, Pilot	Day: Position forearms flat against each other in front of and perpendicular to body Night: Same as day, except with wands
	Elevator Safety Petty Officer/Director	Elevator Operator	Day: Raise both index fingers extended upward at chest level, in close together, near body Night: Raise both wands pointed upward at shoulder level, close together, and near body
	Elevator Safety Petty Officer/Director	Elevator Operator	Day: Lower both index fingers, extended downward, chest level, close together, and near body Night: Lower both wands pointed downward at waist level, in close together, and near body

Figure F-1. Aircraft Handling Signals (cont'd)

AIRCRAFT HANDLING SIGNALS

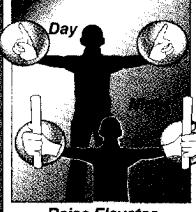
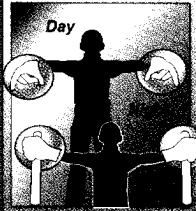
SIGNAL	FROM	TO	EXECUTION
	Elevator Safety Petty Officer/Director	Elevator Operator	Day: Fully extend both arms with index finger pointing upward Night: Fully extend both arms with wands pointing upward
	Elevator Safety Petty Officer/Director	Elevator Operator	Day: Fully extend both arms with index finger pointing downward Night: Fully extend both arms with wands pointing downward
SIGNAL: DAY	NIGHT	MEANING	RESPONSE
	RED banded wands overhead with tips touching	Pilot/Copilot/NFO: Check all armament switches OFF or SAFE	Pilot/Copilot/NFO: Raise both hands into view of arming supervisor after checking switch positions. (Hands remain in view during check and hookup)
	Same as day but with RED banded wands	Arming Crew: Perform stray voltage checks	Arming Crew: Give "thumbs up" to arming supervisor if no stray voltage exists. "Thumbs down" indicates stray voltage problems. Night: Vertical sweep with flashlight indicates no stray voltage. Horizontal sweep indicates stray voltage

Figure F-1. Aircraft Handling Signals (cont'd)

Aircraft Handling Signals

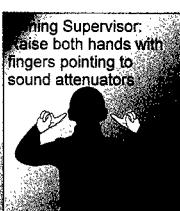
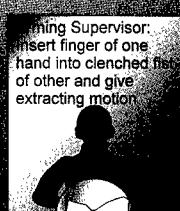
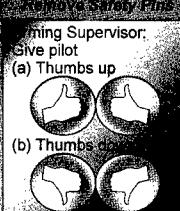
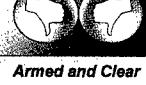
SIGNAL: DAY	NIGHT	MEANING	RESPONSE
 Arming Supervisor: raise fist, extended upward to meet horizontal palm of other hand	 Form a tee with RED banded wands	Arming Crew: Arm weapons (as applicable)	Arming Crew: Give arming supervisor "thumbs up" when arming completed and clear immediate area. "Thumbs down" if malfunction exists. Night: Vertical sweep with flashlight indicates arming completed. Horizontal sweep indicates malfunction
 Arming Supervisor: raise both hands with fingers pointing to sound attenuators	Same as day. Tips of RED banded wands touching sound attenuators	Arming Crew: Perform missile check	Pilot: Give arming supervisor "thumbs up" if tone is heard. "Thumbs down" if no tone Night: Same as signal 3 above
 Arming Supervisor: insert finger of one hand into clenched fist of other and give extracting motion	 Touch tips of RED banded wands in front of body. Then move one wand laterally in a sweeping motion	Arming Crew: Remove bomb rack/pylon safety pins	Arming Crew: Shows pins to arming supervisor and clear immediate area Night: Same as signal 3 above
 Arming Supervisor: Give pilot (a) Thumbs up  (b) Thumbs down 	(a) Vertical sweep with RED banded wand (b) Horizontal sweep with RED banded wand	Pilot: (a) Aircraft armed and all personnel and equipment clear (b) Aircraft down for weapons	Pilot: (a) Acknowledge with similar signal (b) Acknowledge with similar signal
 Crossed standard RED wands held overhead	Crossed standard RED wands held overhead	Suspend all arming/safety operations on aircraft	Suspend arming and await further instructions

Figure F-1. Aircraft Handling Signals (cont'd)

Appendix F

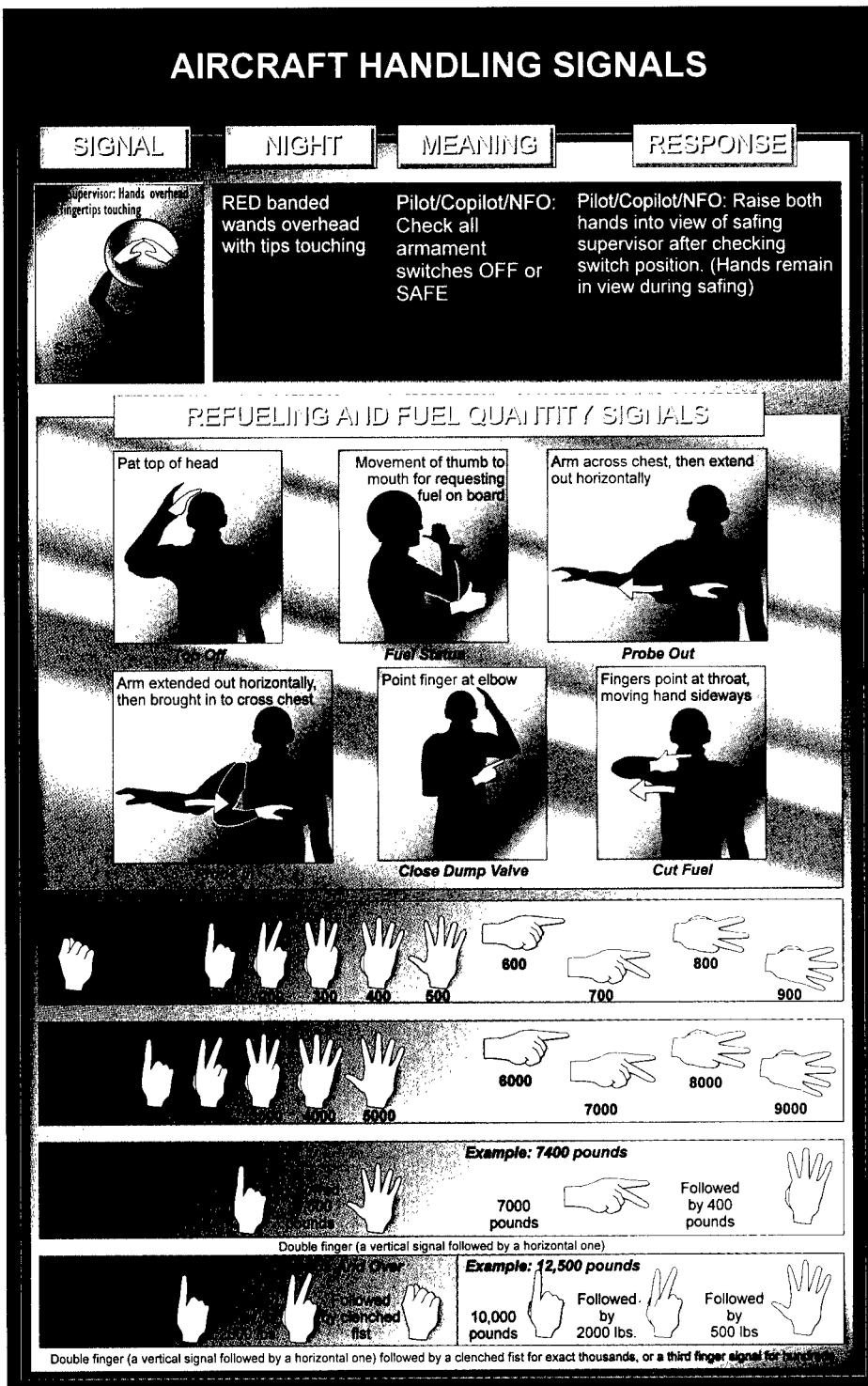


Figure F-1. Aircraft Handling Signals (cont'd)

APPENDIX G BREVITY CODES

ABORT. Cancel mission or I am unable to continue mission.

ALERT _____. Weapons to be launched, fired, or to be airborne within _____ minutes.

ALPS. Estimated time of arrival at station.

ANGELS _____. Height of friendly aircraft in thousands of feet or fly (am flying at) height indicated in thousands of feet, angels TEN (10,000 feet). If other than whole thousands of feet are required, hundreds will be expressed as tenths of one thousand feet separated by the word point, e.g., ANGELS TWO POINT FIVE (2,500 feet), ANGELS POINT NINE (900 feet).

ARMAMENT (SAFE/HOT). Select armament (SAFE/HOT) or armament is (SAFE/HOT).

_____ AWAY. Weapon indicated has been fired or released.

BALLBAT. Executive order to attack within limits.

BEADWINDOW. Your last transmission disclosed an essential element of friendly information (EEFI). The number that follows, taken from the EEFI list in force (see ACP 125), identifies the nature of the disclosure.

BENT. Equipment indicated is inoperative. Canceled by OKAY.

BINGO. Proceed/Am proceeding to alternate or specified field or carrier.

BIRD. Surface-to-air missile.

BOGEY. An air contact that is unidentified and assumed to be enemy.

BOWWAVE:

B—Below or Base of cloud in thousands of feet. If below one thousand feet, use hundreds of feet but ADD THE WORD “HUNDRED.”

O—Over or top of cloud layer in thousands of feet. If unknown use word “unknown.”

Note: If there is more than one cloud layer, report the base and top of the lower formation, followed by the base and top of progressively higher layers (e.g., “two, twelve, seventeen, twenty-five”).

W—Wind (8 points, N, NE, E, S, SW, W, NW) plus the velocity in knots. When wind is missing, omit or use the word “unknown.”

Appendix G

W—Weather. General description of weather in plain language; such as clear; partly cloudy; cloudy; overcast; light, moderate, or heavy rain; mist; haze; thunderstorm; and distant lightning. Amplification of the weather should be made at the end of the report under "E."

A—Amount of clouds in tenths.

V—Visibility in miles. Use a fraction if less than 1 mile.

E—Extra phenomena of significance such as turbulence, icing, heavy sea or swell, and description of front. This is an elaboration of the report that includes anything of interest in plain and concise language.

BREAKAWAY _____. Magnetic course to fly after attack or completion of intercept is (three-digit group).

BROWNIE. Photographic devices.

BRUISER. Air-to-surface missile.

BULLDOG. Surface-to-surface missile.

BULLY. Concentrate attack on enemy target.

BUSTER. Fly at maximum continuous speed (power).

CANARY. "I" Band transponder.

CANDLE. Night illumination device.

CAP. Combat air patrol.

CERTSUB. Contact classified as certain submarine.

CHARLIE. Clearance to land; a numbered suffix indicates time delay in minutes before landing may be expected.

CHAMP. Carrier-based antisubmarine warfare (ASW) fixed-wing aircraft capable of search and attack.

CHATTER. Communications jamming.

CHERUBS. Aircraft altitude in hundreds of feet.

CHICKS. Friendly fighter aircraft.

CIPHER. UHF/HF voice encrypt or decrypt device.

Brevity Codes

CLAM. Cease all or indicated electromagnetic and/or acoustice missions in accordance with national instructions and exercise orders. Potential intelligence collector(s) in area (estimated duration of CLAM hours).

CONTACT. Contact of interest.

COWBOY(S). Ship(s) of search attack group.

DART. Aircraft rocket.

DATUM. Last known position of a submarine or suspected submarine after contact has been lost. Can also be used when referring to any target of interest's last known position on the ocean's surface, e.g., survivor, missile, mine, vessels.

DECK CLEAR. Deck is now ready to resume launching and landing operations.

DECK FOUL. Unable to launch or land aircraft (followed by a numeral to indicate minutes anticipated before ready to resume operations).

DELTA (____). (____) Hold and conserve fuel at altitude and position indicated.

DIP BOSS. ASW helicopter flight leader.

DITCHING. The forced alighting of an aircraft on water.

DIVERT. Proceed to alternate mission.

DROP POINT. Position of weapons release.

EMERGENCY STREAMER. Helicopter in forward flight effecting in-flight recovery of up to 450 feet of sonar cable.

FAMISHED. Have you any instructions or information for me?

FATHER. TACAN.

FEET DRY. I am, or contact indicated is, over dry land.

FEET WET. I am, or contact indicated is, over water.

FOX. Air-to-air missile.

FREDDIE. Controlling unit for aircraft.

FREELANCE. Advisory control of aircraft is being employed or operated under advisory control.

Appendix G

FREEZE. Executive order to designated helicopter(s) to remain hovering in present position (canceled only by MELT).

GADGET. Radar or emitter equipment (type of equipment may be indicated by a letter as listed in OPORD or appropriate publication).

GASMAN. Oil tanker.

GINGERBREAD. Voice imitative deception is suspected on this net.

HEADS UP. Enemy got through (part or all). Trouble headed your way. (May be followed by amplification as to type of threat: BOGIES, BIRD).

HEY RUBE. Need support. Come to my assistance.

HIGH DRINK. Helicopter in flight refueling from a surface vessel.

HIGHWAY. Search _____ degrees from _____ (reference point).

HOLDING HANDS. Aircraft are joined or in close formation.

HOMEPLATE. Home airfield or home carrier.

HOOKER. Fishing or other small craft.

HORNET. Floating or drifting mine.

IN THE DARK. Not visible on my scope and any position information is estimated.

INDIANS. Ships of a surface action group.

INTRUDER. Unknown warship.

JUDY. Have visual on the contact.

KINGPIN. Reference point or sonobuoy estimated for reporting the position.

LIFEGUARD. Submarine or surface ship designated for SAR operations or a submarine or surface ship stationed geographically for precautionary SAR assistance. Also, the name of the unit designated to recover a man overboard for vessels conducting alongside operations.

LOST TRACK. Previous contact lost, provide target information.

MARSHAL. Enter holding at specific point.

MAYDAY. The international radio telephone distress signal that indicates that a ship, aircraft, or other vehicle is threatened by grave and imminent danger and requests immediate assistance.

Brevity Codes

MEATBALL. Pilot has landing aid source light image.

MELT. Informs helicopters that their movements are no longer restricted by FREEZE order.

MOTHER. Parent ship.

MULE. Ocean tugboat.

MUSIC. Electronic jamming (hostile, unknown, or friendly).

NANCY. Infrared equipment.

NOCAN. Unable to comply.

NOJOY. I've been unsuccessful or have no info.

ON TOP. I am over the datum, target, objective, or position indicated.

ORANGES SOUR. Weather is unsuitable for aircraft mission.

ORANGES SWEET. Weather is suitable for aircraft mission.

PAN. The international radiotelephone urgency signal meaning the calling station has a very urgent message to transmit concerning the safety of a ship, aircraft, or other vehicle or the safety of a person.

PANCAKE. Land, or I wish to land (reason may be specified, e.g., PANCAKE AMMO, PANCAKE FUEL).

PANTHER. Enemy nuclear submarine.

PARROT. A military IFF transponder.

PEDRO. USN rescue helicopter.

PELICAN. ASW long-range patrol aircraft capable of both search and attack.

PIGEONS _____. The magnetic bearing and distance of HOMEPLATE (or unit from you is _____ degrees _____ miles).

PIRATE. Fast-moving surface radar contact, unidentified but assumed hostile.

PLAYMATE. Friendly ship, submarine, or aircraft with which I am operating.

___ POGO ___. Switch to communications channel number preceding POGO. If unable to establish communications, switch to channel number following POGO. If no channel number follows POGO, return to this channel.

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POPEYE. In clouds or area of reduced visibility.

PREP CHARLIE. Carrier(s) addressed land aircraft when ready. (Relay to aircraft when ready).

PREVIEW. Advisory control of aircraft is being employed or operate under advisory control. The assault craft unit requires notice from the aircraft of changes in heading, speed, and altitude.

PRONTO. As quickly as possible.

RAT. Enemy fighter.

RATFINK. Enemy bomber.

RECCO. Aircraft search units.

RED. Attack by enemy aircraft or missile is imminent.

RESCAP. Rescue combat air patrol; provides protection to rescue vehicles from hostile forces during all phases of SAR.

SAUNTER. Fly at best endurance.

SCAN. Search sector indicated and report any contacts.

SCRAM-(DIRECTION). Friendly unit is in immediate danger, withdraw or clear in the direction indicated for safety.

SEE ME/YOU. Visual sighting of ship or aircraft.

SKIP IT. Do not attack, cease attack, cease interception.

SKUNK. A surface contact that is unidentified but assumed to be enemy.

SLY. Enemy patrol boat.

SNEAKER. SIGINT-configured nonfriendly vessel.

SOLO. Aircraft proceed on independent operations.

SOUR. Equipment indicated is not operating efficiently.

SPRITE. LAMPS aircraft.

STATE. Fuel state in hours and minutes.

STEER _____. Set magnetic heading indicated to reach me (or______).

Brevity Codes

STRANGER. An unidentified contact not associated with action in progress. (Bearing, range, and altitude relative to you).

STRANGLE. Switch off equipment indicated.

SWEET. Equipment indicated is operating efficiently.

TAKE WITH. Engage target (indicated) with weapon (indicated).

TALLY HO. Target visually sighted.

TRACKING ____ SPEED _____. By my evaluation, contact is steering true course and at speed indicated.

TROUT. Fishing trawler.

VAMPIRE. Hostile missile. (Amplifying information should follow as available.)

VAT "B." Short weather report giving:

V—Visibility in miles.

A—Amount of clouds in tenths.

T—Height of cloud top in thousands of feet.

B—Height of cloud base in thousands of feet.

VECTAC. Vectored attack. (Ordered by "Executive RADAR VECTAC" or "EXECUTE INFORMATIVE VECTAC.")

VECTOR _____. Alter heading to magnetic or true heading indicated. Heading indicated must be in three digits; e.g., VECTOR ZERO SIX ZERO (for homing, use STEER).

WARNING. Enemy attack.

WARNING RED. Attack by hostile aircraft or missile is imminent.

WARNING WHITE. Attack by hostile aircraft or missile is improbable.

WARNING YELLOW. Attack by enemy hostile aircraft or missile is probable.

WEAPONS FREE. Fire may be opened on all aircraft not recognized as friendly.

WEAPONS TIGHT. Do not open fire or cease firing on any aircraft (or on BOGEY specified or in section indicated) unless target(s) known to be hostile.

WHAT FUEL. Report amount of fuel remaining.

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WHAT LUCK. What are/were the results of assigned mission?

WHAT STATE. Report amount of fuel and missiles remaining. Ammunition and oxygen are reported only when specifically requested or critical.

WHITE. Attack improbable.

YELLOW. Attack is probable.

ZIPLIP. A condition that can be prescribed in which flight operations conducted in VMC conditions have positive communications control waived and only radio transmissions required for flight safety are permitted.

ZIPPO. Alerts units that a missile attack is imminent or in progress.

ZOMBIE. An unidentified track observed adhering to the normal traffic pattern and whose behavior does not constitute a threat.

APPENDIX H REFERENCES

The development of Joint Pub 3-04.1 is based upon the following primary references.

1. Manuals

- a. COMDTINST M3710.2 (series), "USCG Shipboard Helicopter Operational Procedures Manual."
- b. NAVAIR 00-80T-105, "CV NATOPS Manual."
- c. NAVAIR 00-80T-106, "LHA/LPH/LHD NATOPS Manual."
- d. NWP 3-04.1M, "Helicopter Operating Procedures for Air Capable Ships."

2. International Publication

- a. NATO-APP 2C, "Helicopter Operations From Ships Other Than Aircraft Carriers (HOSTAC)."

3. US Publications

- a. Joint Pub 0-2, "Unified Action Armed Forces (UNAAF)."
- b. Joint Pub 1-01, "Joint Publication System, Joint Doctrine and JTTP Development Program."
- c. Joint Pub 1-02, "DOD Dictionary of Military and Associated Terms."
- d. Joint Pub 3-0, "Doctrine for Joint Operations."
- e. Joint Pub 3-04, "Doctrine for Joint Maritime Operations (Air)."
- f. Joint Pub 3-50, "National Search and Rescue Manual Vol I: National Search and Rescue System."
- g. Joint Pub 3-50.1, "National Search and Rescue Manual Vol II: Planning Handbook."
- h. NAWCAD ENG-7576, "Shipboard Aviation Facilities Resume."
- i. NAVAIR 11-1-116B/TWO010-AA-ORD-030, "Naval Ammunition Logistic Codes (NALC)."
- j. NAVAIR 11-1F-2, "Fuze Manual, Airborne Bomb and Rocket, Description and Characteristics."

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- k. NAVAIR 11-75A-61, “2.75 Inch Airborne Rocket Launchers (LAU-61, 68 series).”
- l. NAVAIR 11-85-5, “Airborne Rockets.”
- m. NAVAIR 11-120A-1.1/1.2, “Airborne Weapons Packaging, Handling and Stowage.”
- n. NAVAIR 16-1-529, “Radiation Hazards.”
- o. NAVAIR 19-15BC-12, “AERO-12C, Bomb Skid.”
- p. NAVAIR 19-95-1, “Airborne Weapons/Stores Manual Checklist, Transportation and Loading Equipment Configuration.”
- q. NAVAIR 19-600-96-6-4, “Calendar Maintenance Requirement Cards Bomb Skid, AERO-12B/C.”
- r. NAVAIR NA-00-80R-14, “Aircraft Firefighting & Rescue Manual.”
- s. NAVSEA OP-4, “Ammunition Afloat.”
- t. NAVSEA OP-1014, “Ordnance Safety Precautions.”
- u. NAVSEA OP-2165 Volume 1, “Navy Transportation Safety Handbook.”
- v. NAVSEA OP-2212 SW060-AA-MMA-010, “Demolition Material.”
- w. NAVSEA OP-2238, “Identification of Ammunition.”
- x. NAVSEA OP-3347, “US Navy Ordnance Safety Precautions.”
- y. NAVSEA S9086-VG-STM-000, “Naval Ships Technical Manual, Chapter 7.”
- z. NAVSEA S9522-AA-HBK-010, “Instruction Book Magazine Sprinkler System.”
- aa. NAVSEA SW050-AB-MMA-010, “Pyrotechnic Screening and Marking Devices.”
- bb. NAVSEA SW050-AC-ORD-010/NA 11-15-8, “Toxic Hazard Associated with Pyrotechnic Devices.”
- cc. AW-820YB-MIB-000, “HELLFIRE Missile, Fleet Missile Maintenance.”
- dd. TM 9-1005-213-25, “.50 Caliber Machine Gun.”
- ee. TM 9-1425-429-12, “STINGER Missile; Operational Organizational Maintenance Manual.”

References

4. Instructions

- a. CFR46 Code of Federal Regulations 146.29, “Detailed Regulations Governing the Transportation of Military Explosives and Hazardous Munitions Onboard Vessels.”
- b. COMNAVSURFLANTINST 8023.4/COMNAVSURFPACINST 8023.5, “Non-Nuclear Ordnance/Explosive Handling Qualification and Certification Program.”
- c. COMNAVSURFLANTINST 9093.3, “Commander Naval Surface Force, US Atlantic Fleet Combat System Officers Manual.”
- d. Naval Safety Center Instruction 8020.1, “Ship/Submarine Explosives Safety Surveys and Checklist.”
- e. NAVSEAINST 8020.6 (series), “Weapon System Explosive Safety Review Program.”
- f. OPNAVINST 3120.32 (series), “Standard Organization and Regulations of the US Navy.”
- g. OPNAVINST 5100.19 (series), “Navy Safety Precautions for Forces Afloat.”
- h. OPNAVINST 5102.1 (series), “Mishap Investigation and Reporting.”
- i. OPNAVINST 5530.1 (series), “Department of the Navy Physical Security Instruction for Sensitive Conventional Arms, Ammunition, and Explosives (AA&E).”
- j. OPNAVINST 8600.2 (series), “Naval Airborne Weapons Maintenance Manual.”
- k. SPCCINST 8010.12, “Supply Management of Ammunition; Policy, Procedures and Responsibilities.”

5. Bills

Ship’s Bills are specific to individual ships and held onboard by each ship.

- a. Ship’s EMCON Bill
- b. Ship’s HERO Bill
- c. Ship’s HERO Survey
- d. Ship’s Fire Bill
- e. Ship’s Helicopter Certification
- f. General Quarters Bill
- g. (Helicopter) Flight Quarters Bill

Appendix H

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APPENDIX J **ADMINISTRATIVE INSTRUCTIONS**

1. User Comments

Users in the field are highly encouraged to submit comments on this publication to the Joint Warfighting Center, Attn: Doctrine Division, Fenwick Road, Bldg 96, Fort Monroe, VA 23651-5000. These comments should address content (accuracy, usefulness, consistency, and organization), writing, and appearance.

2. Authorship

The lead agent for this publication is the US Navy. The Joint Staff doctrine sponsor for this publication is the Director for Operational Plans and Interoperability (J-7).

3. Supersession

This publication supersedes Joint Pub 3-04.1, 28 June 1993, "Joint Tactics, Techniques, and Procedures for Shipboard Helicopter Operations."

4. Change Recommendations

- a. Recommendations for urgent changes to this publication should be submitted:

TO: CNO WASHINGTON DC/N511//
INFO: JOINT STAFF WASHINGTON DC/J7-JDD//

Routine changes should be submitted to the Director for Operational Plans and Interoperability (J-7), JDD, 7000 Joint Staff Pentagon, Washington, DC 20318-7000.

- b. When a Joint Staff directorate submits a proposal to the Chairman of the Joint Chiefs of Staff that would change source document information reflected in this publication, that directorate will include a proposed change to this publication as an enclosure to its proposal. The Military Services and other organizations are requested to notify the Director, J-7, Joint Staff, when changes to source documents reflected in this publication are initiated.

- c. Record of Changes:

CHANGE NUMBER	COPY NUMBER	DATE OF CHANGE	DATE ENTERED	POSTED BY	REMARKS

Appendix J

5. Distribution

- a. Additional copies of this publication can be obtained through Service publication centers.
- b. Only approved pubs and test pubs are releasable outside the combatant commands, Services, and Joint Staff. Release of any classified joint publication to foreign governments or foreign nationals must be requested through the local embassy (Defense Attach Office) to DIA Foreign Liaison Office, PSS, Room 1A674, Pentagon, Washington, DC 20301-7400.
- c. Additional copies should be obtained from the Military Service assigned administrative support responsibility by DOD Directive 5100.3, 1 November 1988, "Support of the Headquarters of Unified, Specified, and Subordinate Joint Commands."

By Military Services:

Army: US Army AG Publication Center, SL
1655 Woodson Road
Attn: Joint Publications
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Air Force: Air Force Publications Distribution Center
2800 Eastern Boulevard
Baltimore, MD 21220-2896

Navy: CO, Naval Inventory Control Point
700 Robbins Avenue
Bldg 1, Customer Service
Philadelphia, PA 19111-5099

Marine Corps: Marine Corps Logistics Base
Albany, GA 31704-5000

Coast Guard: Coast Guard Headquarters, COMDT (G-OPD)
2100 2nd Street, SW
Washington, DC 20593-0001

- d. Local reproduction is authorized and access to unclassified publications is unrestricted. However, access to and reproduction authorization for classified joint publications must be in accordance with DOD Regulation 5200.1-R.

GLOSSARY

PART I—ABBREVIATIONS AND ACRONYMS

1MC	general announcing system
AAAS	amphibious aviation assault ship
ACS	air-capable ship
AEPS	aircrew escape propulsion system
AOSS	aviation ordnance safety supervisor
AS	aviation ship
ASW	antisubmarine warfare
AWSE	armament weapons support equipment
BRCC	base recovery course
CATCC	carrier air traffic control center
CCA	carrier-controlled approach
CIC	combat information center
CNO	Chief of Naval Operations
CO	commanding officer
COMDTINST	Commandant, United States Coast Guard Instruction
COMNAVAIRSYSCOM	Commander, Naval Air Systems Command
COMNAVSEASYSCOM	Commander, Naval Sea Systems Command
CRIF	cargo routing information file
CV	aircraft carrier
DF	direction finding
DI	dynamic interface
DLQ	deck landing qualification
DOD	Department of Defense
DODIC	Department of Defense identification code
EEFI	essential elements of friendly information
ELVA	emergency low visibility approach
EMCON	emission control
EMV	electromagnetic vulnerability
FLOLS	fresnel lens optical landing system
FOD	foreign object damage
HAC	helicopter aircraft commander
HCO	helicopter control officer
HCS	helicopter control station
HDC	helicopter direction center
HEFOE	hydraulic electrical fuel oxygen engine
HERO	hazards of electromagnetic radiation to ordnance
HF	high frequency

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HIFR	helicopter in-flight refueling
HRS	Horizon Reference System
I	individual
IAW	in accordance with
IFF	identification, friend or foe
IFR	instrument flight rules
IMC	instrument meteorological conditions
IN	instructor
IP	instructor pilot
JAG	Judge Advocate General
JFC	joint force commander
JTTP	joint tactics, techniques, and procedures
LHA	general purpose amphibious assault ship
LHD	general purpose amphibious assault ship (with internal dock)
LOI	letter of instruction
LOTS	logistics over-the-shore
LPH	amphibious assault ship, landing platform helicopter
LSE	landing signal enlisted
LSO	landing signal officer
MAP	missed approach point
MOU	memorandum of understanding
NALC	naval ammunition logistics code
NATOPS	naval air training and operating procedures standardization
NAVAIDS	navigation aids
NAVAIR	naval air
NAVMTO	naval military transportation office
NAVSEA	naval sea
NAVSEAINST	Naval Sea Instruction
NAWCAD	Naval Air Warfare Center, Aircraft Division
NDB	nondirectional beacon
NVD	night vision device
NWP	naval warfare publication
OCE	officer conducting the exercise
OIC	officer in charge
OLS	optical landing system
OOD	officer of the deck
OPNAVINST	Chief of Naval Operations Instruction
OPORD	operation order
OTC	officer in tactical command
PAR	precision approach radar
PC	pilot-in-command

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POD	Plan of the Day
QA	quality assurance
RAST	Recovery Assistance, Securing, and Traversing Systems
SAR	search and rescue
SGSI	stabilized glide slope indicator
SO	safety observer
SOF	special operations forces
SSCO	shipper's service control office
TACAN	tactical air navigation
TL	team leader
TM	team member
TYCOM	type commander
UHF	ultra high frequency
USA	US Army
USAF	US Air Force
USCG	US Coast Guard
USMC	US Marine Corps
USN	US Navy
UT	unit trainer
VERTREP	vertical replenishment
VHF	very high frequency
VMC	visual meteorological conditions
V/STOL	vertical/short takeoff and landing aircraft
WSESRB	Weapon System Explosive Safety Review Board
XO	executive officer

PART II—TERMS AND DEFINITIONS

air-capable ship. All ships other than aircraft carriers; aircraft carriers, nuclear; amphibious assault ships, landing platform helicopter; general purpose amphibious assault ships; or general purpose amphibious assault ships (with internal dock) from which aircraft can take off, be recovered, or routinely receive and transfer logistic support. (Approved for inclusion in the next edition of Joint Pub 1-02.)

aircraft release and control. Applies to those procedures in the Release and Control Section of the applicable aircraft loading manual or checklist. (This term and its definition are applicable only in the context of this pub and cannot be referenced outside of this publication.)

ambient temperature. Outside temperature at any given altitude, preferably expressed in degrees centigrade. (Approved for inclusion in the next edition of Joint Pub 1-02.)

amphibious aviation assault ship. An amphibious assault ship, landing platform helicopter; general purpose amphibious assault ship; or general purpose amphibious assault ship (with internal dock). (Approved for inclusion in the next edition of Joint Pub 1-02.)

approach control. A control station in an air operations control center, helicopter direction center, or carrier air traffic control center, which is responsible for controlling air traffic from marshal until handoff to final control. (Approved for inclusion in the next edition of Joint Pub 1-02.)

arm or de-arm. Applies to those procedures in the arming or de-arming section of the applicable aircraft loading manual or checklist that places the ordnance or

explosive device in a ready or safe condition i.e., rocket launchers, guided missiles, guns—internal and pods, paraflares—(external and SUU-44/25 dispenser). (NOTE: The removal or installation of pylon or bomb rack safety pins from a nonordnance-loaded station is considered a function requiring certification within the purview of this publication.) (Approved for inclusion in the next edition of Joint Pub 1-02.)

arming. As applied to explosives, weapons, and ammunition, the changing from a safe condition to a state of readiness for initiation. (Joint Pub 1-02)

aviation ship. An aircraft carrier or aircraft carrier, nuclear. (Approved for inclusion in the next edition of Joint Pub 1-02.)

ball. A pilot voice report that the visual landing aid is in sight. (This term and its definition are applicable only in the context of this pub and cannot be referenced outside of this publication.)

base recovery course. A ship's magnetic heading for aircraft recovery. Also called BRC. (This term and its definition are applicable only in the context of this pub and cannot be referenced outside of this publication.)

bill. A ship's publication listing operational or administrative procedures. (Approved for inclusion in the next edition of Joint Pub 1-02.)

bingo. 1. When originated by pilot, means, "I have reached minimal fuel for safe return to base or to designated alternate." 2. When originated by controlling activity, means, "Proceed to alternate airfield or carrier as specified." (Joint Pub 1-02)

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cartridge actuated device. Small explosive devices used to eject stores from launched devices, actuate other explosive systems, or provide initiation for aircrew escape devices. (Approved for inclusion in the next edition of Joint Pub 1-02.)

combatant command (command authority). Nontransferable command authority established by title 10 (“Armed Forces”), United States Code, section 164, exercised only by commanders of unified or specified combatant commands unless otherwise directed by the President or the Secretary of Defense. Combatant command (command authority) cannot be delegated and is the authority of a combatant commander to perform those functions of command over assigned forces involving organizing and employing commands and forces, assigning tasks, designating objectives, and giving authoritative direction over all aspects of military operations, joint training, and logistics necessary to accomplish the missions assigned to the command. Combatant command (command authority) should be exercised through the commanders of subordinate organizations. Normally this authority is exercised through subordinate joint force commanders and Service and/or functional component commanders. Combatant command (command authority) provides full authority to organize and employ commands and forces as the combatant commander considers necessary to accomplish assigned missions. Operational control is inherent in combatant command (command authority). Also called COCOM. (Joint Pub 1-02)

Commander, Naval Sea Systems Command OP-4. NAVSEA OP-4 is a publication that prescribes the minimum safety and certification requirements for issue, receiving, handling, stowage, surveillance, maintenance, and return of conventional ammunition along with the preparation of

associated reports by units afloat. Also called COMNAVSEASYSCOM OP-4. (This term and its definition are applicable only in the context of this pub and cannot be referenced outside of this publication.)

control area. A controlled airspace extending upwards from a specified limit above the Earth. (Joint Pub 1-02)

control zone. A controlled airspace extending upwards from the surface of the Earth to a specified upper limit. (Joint Pub 1-02)

de-arming. An operation in which a weapon is changed from a state of readiness for initiation to a safe condition. Also called safing. Also see arm or de-arm. (Approved for inclusion in the next edition of Joint Pub 1-02.)

deck status light. A three-colored light (red, amber, green) controlled from the primary flight control. Navy—The light displays the status of the ship to support flight operations. USCG—The light displays clearance for a helicopter to conduct a given evolution.

Red deck status—The helicopter is not cleared for landing, takeoff, vertical replenishment, or helicopter in-flight refueling.

Amber deck status—The helicopter is cleared to start engine(s) and engage or disengage rotors.

Green deck status—The helicopter is cleared for landing, takeoff, vertical replenishment, or helicopter in-flight refueling. (This term and its definition are applicable only in the context of this pub and cannot be referenced outside of this publication.)

density altitude. An atmospheric density expressed in terms of the altitude which

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corresponds with that density in the standard atmosphere. (Joint Pub 1-02)

downloading. An operation that removes airborne weapons or stores from an aircraft. (Approved for inclusion in the next edition of Joint Pub 1-02.)

droop stop. A device to limit downward vertical motion of helicopter rotor blades upon rotor shutdown. (Joint Pub 1-02)

electro-explosive device. An explosive or pyrotechnic component that initiates an explosive, burning, electrical, or mechanical train and is activated by the application of electrical energy. (Joint Pub 1-02)

electromagnetic compatibility. The ability of systems, equipment, and devices that utilize the electromagnetic spectrum to operate in their intended operational environments without suffering unacceptable degradation or causing unintentional degradation because of electromagnetic radiation or response. It involves the application of sound electromagnetic spectrum management; system, equipment, and device design configuration that ensures interference-free operation; and clear concepts and doctrines that maximize operational effectiveness. Also called EMC. (Joint Pub 1-02)

electromagnetic environment. The resulting product of the power and time distribution, in various frequency ranges, of the radiated or conducted electromagnetic emission levels that may be encountered by a military force, system, or platform when performing its assigned mission in its intended operational environment. It is the sum of electromagnetic interference; electromagnetic pulse; hazards of electromagnetic radiation to personnel, ordnance, volatile materials; and natural phenomena effects of lightning and p-static. Also called EME. (Joint Pub 1-02)

electromagnetic interference. Any electromagnetic disturbance that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics/electrical equipment. It can be induced intentionally, as in some forms of electronic warfare, or unintentionally, as a result of spurious emissions and responses, intermodulation products, and the like. Also called EMI. (Joint Pub 1-02)

electromagnetic vulnerability. The characteristics of a system that cause it to suffer a definite degradation (incapability to perform the designated mission) as a result of having been subjected to a certain level of electromagnetic environmental effects. Also called EMV. (Joint Pub 1-02)

emergency marshal. A marshal established by an air operations control center, helicopter direction center, or carrier air traffic control center and given to each pilot before launch with an altitude and an emergency expected approach time. The emergency marshal radial will have a minimum of 30 degree separation from the primary marshal. (Approved for inclusion in the next edition of Joint Pub 1-02.)

final bearing. The magnetic bearing assigned by an air operations center, helicopter direction center, or carrier air traffic control center for final approach; an extension of the landing area centerline. (Approved for inclusion in the next edition of Joint Pub 1-02.)

Flight Deck Officer. Officer responsible for the safe movement of aircraft on or about the flight deck of an aviation-capable ship. Also called FDO. (Approved for inclusion in the next edition of Joint Pub 1-02.)

flight quarters. A ship configuration that assigns and stations personnel at critical positions to conduct safe flight operations. (Joint Pub 1-02)

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foreign object damage. Rags, pieces of paper, line, articles of clothing, nuts, bolts, or tools that when misplaced or caught by air currents normally found around aircraft operations (jet blast, rotor or prop wash, engine intake) cause damage to aircraft systems or weapons or injury to personnel. Also called FOD. (Joint Pub 1-02)

guard. 1. A security element whose primary task is to protect the main force by fighting to gain time, while also observing and reporting information. 2. A radio frequency that is normally used for emergency transmissions and is continuously monitored. UHF band: 243.0 MHZ; VHF band: 121.5 MHZ. (This term and its definition modifies the existing term and its definition and is approved for inclusion in the next edition of Joint Pub 1-02.)

handling (ordnance). Applies to those individuals who engage in the breakout, lifting, or repositioning of ordnance or explosive devices in order to facilitate storage or stowage, assembly or disassembly, loading or downloading, or transporting. (Approved for inclusion in the next edition of Joint Pub 1-02.)

hazards of electromagnetic radiation to ordnance. The danger of accidental actuation of electro-explosive devices or otherwise electrically activating ordnance because of RF electromagnetic fields. This unintended actuation could have safety (premature firing) or reliability (dudding) consequences. Also called HERO. (Approved for inclusion in the next edition of Joint Pub 1-02.)

helicopter control officer. In nonaviation facility ships, the helicopter control officer will be responsible for the supervision and direction of launching and landing operations and for servicing and handling of all embarked helicopters. Helicopter control officers will be graduates of the

helicopter indoctrination course unless they are designated helicopter pilots. Also called HCO. (Approved for inclusion in the next edition of Joint Pub 1-02.)

helicopter control station. A shipboard aircraft control tower, or, on ships not equipped with a control tower, the communications installation that serves as such. On all Coast Guard cutters, the helicopter control station is located in the pilot house. Also called HCS. (Approved for inclusion in the next edition of Joint Pub 1-02.)

helicopter direction center. In amphibious operations, the primary direct control agency for the helicopter group/unit commander operating under the overall control of the tactical air control center. (Joint Pub 1-02)

HERO SAFE ordnance. Any ordnance item that is percussion initiated, sufficiently shielded or otherwise so protected that all electro-explosive devices contained by the item are immune to adverse effects (safety or reliability) when the item is employed in its expected radio frequency environments, provided that the general hazards of electromagnetic radiation to ordnance requirements defined in the hazards from electromagnetic radiation manual are observed. (Approved for inclusion in the next edition of Joint Pub 1-02.)

HERO SUSCEPTIBLE ordnance. Any ordnance item containing electro-explosive devices proven by test or analysis to be adversely affected by radio frequency energy to the point that the safety and/or reliability of the system is in jeopardy when the system is employed in its expected radio frequency environment. (Approved for inclusion in the next edition of Joint Pub 1-02.)

HERO UNSAFE ordnance. Any ordnance item containing electro-explosive devices that

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has not been classified as HERO SAFE or HERO SUSCEPTIBLE ordnance as a result of a hazards of electromagnetic radiation to ordnance (HERO) analysis or test is considered HERO UNSAFE ordnance. Additionally, any ordnance item containing electro-explosive devices, including those previously classified as HERO SAFE or HERO SUSCEPTIBLE ordnance, which has its internal wiring exposed; when tests are being conducted on the item that result in additional electrical connections to the item; when electro-explosive devices having exposed wire leads are present and handled or loaded in any but the tested condition; when the item is being assembled or disassembled; or when such ordnance items are damaged causing exposure of internal wiring or components or destroying engineered HERO protective devices. (Approved for inclusion in the next edition of Joint Pub 1-02.)

hovering. A self-sustaining maneuver whereby a fixed, or nearly fixed, position is maintained relative to a spot on the surface of the Earth or underwater. (Joint Pub 1-02)

hung weapons. Those weapons or stores on an aircraft that the pilot has attempted to drop or fire but could not because of a malfunction of the weapon, rack or launcher, or aircraft release and control system. (Joint Pub 1-02)

instrument meteorological conditions. Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, less than minimums specified for visual meteorological conditions. Also called IMC. (Joint Pub 1-02)

landing signal officer. Officer responsible for the visual control of aircraft in the terminal phase of the approach immediately prior to landing. Also called LSO. (Approved for inclusion in the next edition of Joint Pub 1-02.)

landing signalman enlisted. Enlisted man responsible for ensuring that helicopters, on signal, are safely started, engaged, launched, recovered, and shut down. Also called LSE. (Approved for inclusion in the next edition of Joint Pub 1-02.)

loading (ordnance). An operation that installs airborne weapons and stores on or in an aircraft and may include fuzing of bombs and stray voltage checks. (Approved for inclusion in the next edition of Joint Pub 1-02.)

magazine inspection. Refers to the close viewing and critical appraisal of existing conditions within ship, station magazines, or lockers, using standards established by NAVSEA OP-4 and OP-5. (This term and its definition are applicable only in the context of this pub and cannot be referenced outside of this publication.)

marshal. A bearing, distance, and altitude fix designated by an air operations center, helicopter direction center, or carrier air traffic control center on which the pilot will orientate holding, and from which initial approach will commence during an instrument approach. (Approved for inclusion in the next edition of Joint Pub 1-02.)

multi-spot ship. Those ships certified to have three or more adjacent landing areas. (Approved for inclusion in the next edition of Joint Pub 1-02.)

Naval Air Training and Operating Procedures Standardization Manual. Series of general and specific aircraft procedural manuals that govern the operations of naval aircraft. Also called NATOPS. (This term and its definition are applicable only in the context of this pub and cannot be referenced outside of this publication.)

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NAVSEA OP-4. Publication that provides policy for ammunition evolutions afloat. (This term and its definition are applicable only in the context of this pub and cannot be referenced outside of this publication.)	(Approved for inclusion in the next edition of Joint Pub 1-02.)
NAVSEA OP-5. Publication that provides policy for ammunition evolutions ashore. (This term and its definition are applicable only in the context of this pub and cannot be referenced outside of this publication.)	positive control. A method of airspace control which relies on positive identification, tracking, and direction of aircraft within an airspace, conducted with electronic means by an agency having the authority and responsibility therein. (Joint Pub 1-02)
nonprecision approach. Radar-controlled approach or an approach flown by reference to navigation aids in which glide slope information is not available. (Joint Pub 1-02)	precision approach. An approach in which range, azimuth, and glide slope information are provided to the pilot. (Joint Pub 1-02)
officer of the deck. The officer of the deck under way has been designated by the commanding officer to be in charge of the ship, including its safe and proper operation. The officer of the deck reports directly to the commanding officer for the safe navigation and general operation of the ship, to the executive officer (and command duty officer if appointed) for carrying out the ship's routine, and to the navigator on sighting navigational landmarks and making course and speed changes. Also called OOD. (Approved for inclusion in the next edition of Joint Pub 1-02.)	presail. The time prior to a ship getting under way used to prepare for at-sea events. (This term and its definition are applicable only in the context of this pub and cannot be referenced outside of this publication.)
operational necessity. A mission associated with war or peacetime operations in which the consequences of an action justify the risk of loss of aircraft and crew. (Approved for inclusion in the next edition of Joint Pub 1-02.)	pressure-altitude. An atmospheric pressure expressed in terms of altitude which corresponds to that pressure in the standard atmosphere. (Joint Pub 1-02)
packup kit. Service-provided maintenance gear including spare parts and consumables most commonly needed by the deployed helicopter detachment. Supplies are sufficient for a short-term deployment but do not include all material needed for every maintenance task.	primary flight control. The controlling agency on aviation ships and amphibious aviation assault ships that is responsible for air traffic control of aircraft within 5 nautical miles of the ship. On Coast Guard cutters, primary flight control duties are performed by a combat information center, but the term PriFly is not used. Also called PriFly. (Approved for inclusion in the next edition of Joint Pub 1-02.)
	single-spot ship. Those ships certified to have less than three adjacent landing areas. (Approved for inclusion in the next edition of Joint Pub 1-02.)
	spot. 1. To determine by observation, deviations of ordnance from the target for the purpose of supplying necessary information for the adjustment of fire. 2. To place in a proper location. 3. An approved shipboard helicopter landing site.

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(This term and its definition modifies the existing term and its definition and is approved for inclusion in the next edition of Joint Pub 1-02.)

spotting. 1. A process of determining by visual or electronic observation, deviations of artillery or naval gunfire from the target in relation to a spotting line for the purpose of supplying necessary information for the adjustment or analysis of fire. 2. An aircraft is parked in an approved shipboard landing site. (This term and its definition modifies the existing term and its definition and is approved for inclusion in the next edition of Joint Pub 1-02.)

stabilized glide slope indicator. An electrohydraulic optical landing aid for use on air-capable ships. With it, a pilot can visually establish and maintain the proper glide slope for a safe approach and landing. The visual acquisition range is approximately 3 miles at night under optimal conditions. Also called SGSI. (Approved for inclusion in the next edition of Joint Pub 1-02.)

standing operating procedure. A set of instructions covering those features of operations which lend themselves to a definite or standardized procedures without loss of effectiveness. The procedure is applicable unless ordered otherwise. Also called SOP. (Joint Pub 1-02)

storage or stowage. Storage is the act of placing material or ammunition and other supplies onboard the vessel. Stowage relates to the act of securing those items stored in such a manner that they do not shift or move during at-sea periods using methods and equipment as approved by higher authority. (Approved for inclusion in the next edition of Joint Pub 1-02.)

strike down. A term used to describe the movement of aircraft from the flight deck to

the hangar deck level. (Approved for inclusion in the next edition of Joint Pub 1-02.)

transporting (ordnance). The movement or repositioning of ordnance or explosive devices along established explosive routes (does not apply to the aircraft flight line). (Approved for inclusion in the next edition of Joint Pub 1-02.)

type command. An administrative subdivision of a fleet or force into ships or units of the same type, as differentiated from a tactical subdivision. Any type command may have a flagship, tender, and aircraft assigned to it. (Joint Pub 1-02)

unexpended weapons or ordnance. Airborne weapons that have not been subjected to attempts to fire or drop and are presumed to be in normal operating conditions and can be fired or jettisoned if necessary. (Approved for inclusion in the next edition of Joint Pub 1-02.)

vertical replenishment. The use of a helicopter for the transfer of material to or from a ship. (Joint Pub 1-02)

visual meteorological conditions. Weather conditions in which visual flight rules apply, expressed in terms of visibility, ceiling height, and aircraft clearance from clouds along the path of flight. When these criteria do not exist, instrument meteorological conditions prevail and instrument flight rules must be complied with. Also called VMC. (Joint Pub 1-02)

warning. 1. A communication and acknowledgment of dangers implicit in a wide spectrum of activities by potential opponents ranging from routine defense measures to substantial increases in readiness and force preparedness and to acts of terrorism or political, economic, or military provocation. 2. Operating

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procedures, practices, or conditions which may result in injury or death if not carefully observed or followed. (This term and its definition modifies the existing term and its definition and is approved for inclusion in the next edition of Joint Pub 1-02.)

wave-off. An action to abort a landing, initiated by the bridge, primary flight control, landing safety officer or enlisted man, or pilot at his or her discretion. The response to a wave-off signal is mandatory. (Approved for inclusion in the next edition of Joint Pub 1-02.)

Weapon System Explosives Safety Review Board. A board designated by the Chief

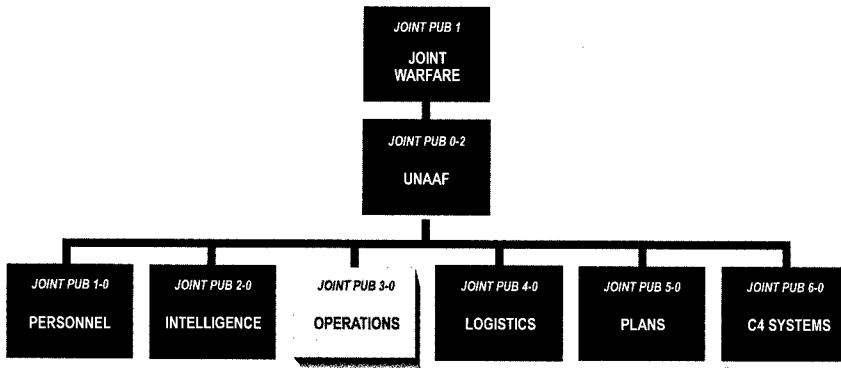
of Naval Operations that reviews safety aspects of weapons or explosive systems and makes recommendations to the Chief of Naval Operations and originating Service regarding acceptance or rejection for use on Navy ships. Also called WSESRB. (This term and its definition are applicable only in the context of this pub and cannot be referenced outside of this publication.)

ZEBRA. Maximum integrity of material condition for ship, except for the closing of outside ventilation, to combat nuclear, chemical, or biological threats. (This term and its definition are applicable only in the context of this pub and cannot be referenced outside of this publication.)

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JOINT DOCTRINE PUBLICATIONS HIERARCHY



All joint doctrine and tactics, techniques, and procedures are organized into a comprehensive hierarchy as shown in the chart above. Joint Pub 3-04.1 is in the Operations series of joint doctrine publications. The diagram below illustrates an overview of the development process:

